

This ADEQ document corresponds to the proposed rule expected to be published in the 9/1/06 Register.

NOTICE OF PROPOSED RULEMAKING

TITLE 18. ENVIRONMENTAL QUALITY

CHAPTER 7. DEPARTMENT OF ENVIRONMENTAL QUALITY

REMEDIAL ACTION

PREAMBLE

<u>1.</u>	<u>Sections Affected</u>	<u>Rulemaking Action</u>
	R18-7-201	Amend
	R18-7-202	Amend
	R18-7-203	Amend
	R18-7-204	Amend
	R18-7-205	Amend
	R18-7-206	Amend
	R18-7-207	Renumber
	R18-7-207	New Section
	R18-7-208	Renumber
	R18-7-208	Repeal
	R18-7-208	New Section
	R18-7-209	Renumber
	R18-7-209	Amend
	R18-7-210	Renumber
	R18-7-210	Amend
	Appendix A	Renumber
	Appendix A	New Appendix
	Appendix B	Renumber
	Appendix B	Amend
	Appendix C	Repeal

2. The statutory authority for the rulemaking, including both the authorizing statutes (general) and the implementing statute (specific):

Authorizing statutes: A.R.S. §§ 49-104(B)(4), 49-104(B)(16), 49-152, and
Laws 1996, Ch. 151, §9
Implementing statutes: A.R.S. §§ 49-151, 49-152

3. A list of all previous notices appearing in the *Register* addressing the proposed rule:

Notice of Rulemaking Docket Opening: 12 A.A.R. pppp, September 1, 2006

4. The name and address of agency personnel with whom persons may communicate regarding the rulemaking:

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5. An explanation of the rules, including the agency's reasons for initiating the rules:

Summary of the Rule

ADEQ is proposing rules that will update and revise Chapter 7, Article 2, last amended on December 4, 1997, to be consistent with current scientific data and statute. Changes

in the rule will: 1) revise and update the existing predetermined Soil Remediation Levels (SRL); 2) replace the Voluntary Environmental Mitigation Use Restriction (VEMUR) requirement with the Declaration of Environmental Use Restriction (DEUR) requirements consistent with A.R.S. § 49-152; 3) expand the determination of compliance with SRLs to include the use of soil gas analyses; 4) revise language regarding the letter of completion to add alternative closure documents consistent with current statute; and 5) require the use of 1×10^{-6} excess lifetime cancer risk level for remediation at sites if the current or currently intended future use is a school or child care facility where children are reasonably expected to be in frequent and repeated contact with the soil.

Overview of the Rule

Introduction. Article 2, Chapter 7 provides the basis for conducting remediation of soil in accordance with A.R.S. §§ 49-151 and 152, A.R.S. § 33-434.01, and other applicable environmental statutes. The last amendment of the rule established predetermined SRLs to protect human health and the environment which were consistent with the methodology used by US EPA and Region 9 EPA guidance for calculation of risk-based screening levels, but deviated from the soil saturation calculation method by allowing an additional one percent saturation of the organic chemical in volumetric soil pore space (see Preamble of December 4, 1997 amendment of Article 2, Chapter 7). This proposed rule retains the practice of utilizing the most current US EPA Region 9 risk assessment practices and methodologies [see “User’s Guide and Background Technical Document for US EPA Region 9’s Preliminary Remediation Goals (PRG) Table”, October 2004, available from <http://www.epa.gov/region09/waste/sfund/prg/index.html>], and updates toxicity data as determined by US EPA and other sources (see OSWER Directive 9285.7-53, December 5, 2004). This section describes how the proposed SRLs have changed as a result of current EPA methodology and data. Any changes from US EPA Region 9 methodology and/or the current soil rule amendment are noted in this section, with rationale provided. Modifications to the proposed rule are also described. Many of these are the result of comments received from the numerous stakeholder meetings held in

2004 and 2005. Stakeholders included members of the business community, the interested public, and regulators, many of whom were involved in the original 1997 rulemaking, and included discussion of administrative and technical issues.

Overall, the proposed predetermined SRLs have been modified with regard to two basic aspects, which are consistent with Region 9 and US EPA. First, during the period since the last rule amendment, toxicity data have been determined to be inappropriate for use, have been newly established, or have been revised based on additional studies conducted. Secondly, the equations for calculating the SRL have been revised to include: greater skin surface contact area with contaminated soils for resident adults and children; less skin surface contact area with contaminated soils for workers; elimination of skin absorption for inorganic chemicals and volatile organic chemicals (semi-volatile organic chemicals remain unchanged); and decreased adherence of soil to the skin of resident adults. ADEQ has elected to deviate from EPA only in the soil ingestion rate for resident adults. EPA based their soil ingestion rate of 100 milligrams per kilogram (mg/kg) on an adult outdoor exposure scenario. ADEQ chose the ingestion rate of 50 mg/kg because this rate is based on an adult indoor exposure scenario, which is more accurate for adults in residential settings.

The proposed predetermined SRLs have been calculated using updated toxicity information as recommended by EPA. In December 2004, EPA established a hierarchy of toxicity data to be used from various available sources. The following hierarchy of sources is recommended in evaluating chemical toxicity for Superfund sites: 1) Integrated Risk Information System (IRIS) and cited references; 2) Provisional Peer Reviewed Toxicity Values (PPRTV) and cited references developed for the EPA OSWER Office of Superfund Remediation and Technology Innovation (OSRTI) programs; and 3) Other toxicity values which include California Environmental Protection Agency (Cal EPA), the Agency for Toxic Substances and Disease Registry (ATSDR) published Minimum Risk Levels (MRLs) for noncancer effects only, the EPA Superfund Health Effects Assessment Summary Tables (HEAST) database and cited

references and others as appropriate. All of the studies cited in these toxicity databases have been subjected to scientific peer-review prior to publication. These toxicity databases undergo periodic updates that result in data that is withdrawn or modified. Data withdrawn from a toxicity source are not adequate for use in calculations of SRLs.

The proposed predetermined SRLs remain consistent with existing SRL methodology for determining saturation ceiling limits (100 percent) for chemicals that are not volatile organics, though this deviates from Region 9 EPA application of a saturation ceiling of 10 percent for these chemicals. ADEQ has retained the 100% saturation ceiling for these chemicals when the risk-based standard exceeds a concentration that represents “pure product”. For volatile organic chemicals, however, the proposed SRLs have been revised to be consistent with Region 9 and US EPA methodology for determination of saturation. This is revised from the previous SRL determination for saturation which provided for an additional one percent saturation of the chemical in soil.

The definitions for soil and soil remediation level have been revised (R18-7-201), and the provision of R18-7-203(C) has been added to allow the use of soil vapor in calculating the concentration of volatile chemicals in soil. These revisions will keep the proposed rule consistent with the advances in technology and modeling which EPA utilizes in determining site-specific and risk-based cleanup levels. The proposed rule allows the use of soil properties and the vapor state of chemicals in soil for resolving difficult and complex contamination issues, such as subsurface plume distribution and verification of remediation goals.

The proposed predetermined SRLs have been modified to include additional consideration for cleanup of contaminants that are carcinogenic at schools and child care facilities where children are reasonably expected to be in frequent and repeated contact with the contaminated soil. Previously, both residential and non-residential SRLs were calculated to achieve the same target risk for any given carcinogenic chemical. This target risk was set at 1 in 1,000,000 (or 1×10^{-6}) excess lifetime cancer risk level when

sufficient evidence supports classification of the chemical as a known human carcinogen (formerly Classification A). All other carcinogens with less adequate weight of evidence (formerly probable B1 or B2, or possible C human carcinogens) were assigned a target risk of 1 in 100,000 (or 1×10^{-5}). The proposed rule does not change this aspect of target risk, except for those sites where property use is currently or is currently intended to be a child care facility or school. For these sites, the applicable residential SRL is set at the 1×10^{-6} excess lifetime cancer risk level [see proposed R18-7-205 (D) and (E)]. Proposed Appendix A now shows residential SRLs at both excess lifetime cancer risk levels, and the known human carcinogens in bold. For instance, a residential property may cleanup carcinogens present in soil to the SRL noted in the 1×10^{-5} risk column, except if the carcinogen appears in bold in Appendix A at which time the SRL in the 1×10^{-6} risk column must be used for this particular chemical. If conditions at this residential site are such that a child care facility or school is intended for development, regardless of the respective concentrations, all carcinogens must be cleaned up to the SRL listed in the 1×10^{-6} risk column. This change reflects the nationwide initiative undertaken by EPA and the National Academy of Science for protection of children's health. Many of the exposures to chemicals which have been evaluated to be protective of human health have not taken into account that childhood behavior and physiology is vastly different from adults, resulting in higher exposures and heightened toxicological susceptibility to their developing systems. The magnitude of these combined impacts is not well understood. Therefore, the objective of the proposed rule is to establish SRLs that serve as adequate safeguards for children due to exposures from a release of chemicals to the environment of schools and child care facilities.

The agency chose the use of 1×10^{-6} risk level for all carcinogenic chemicals for schools and child care facilities. It should be clarified that the weight of evidence for carcinogenic classification is not related to the robustness of studies available for quantifying toxicity. In fact, it is more appropriate to link the degree of confidence in the quantitative toxicity value to the level of target risk. However, this would be nearly impossible to do for nearly 600 chemicals as it would require a chemical-by-chemical

review of the toxicity database. As it stands, when a chemical has adequate human and animal data to support a determination that cancer is known to result from chronic exposures, it is also reasonable to minimize the incidence of this known cancer result by selecting the lower of the two target risks for the SRL. The proposed rule did not change the target health hazard quotient for non-carcinogenic exposure estimations in the 1997 SRLs and it remains at one.

Because US EPA no longer continues the alpha-numeric convention of chemical classification for evidence of carcinogenicity, proposed Appendix A reflects only the status of “carcinogen” and “non-carcinogen” for each chemical. Some chemicals can have both carcinogenic and non-carcinogenic effects. It is the weight of toxicological evidence which determines this. As such, the definitions for carcinogenic and non-carcinogenic chemicals have been proposed in lieu of the “cancer group” definition in order to be consistent with US and Region 9 EPA current practices (see proposed R18-7-201). When a chemical has both carcinogenic and non-carcinogenic characteristics, the lower of the SRLs listed under the non-carcinogenic column and under the appropriate carcinogenic risk column is the applicable cleanup level for that chemical [see proposed R18-7-205(F)].

The proposed rule still authorizes the use and determination of site-specific SRLs. These remain as naturally occurring background levels, and levels determined using a site-specific risk assessment methodology meeting the requirements of the Department and has general consensus within the scientific community. The proposed rule does not change the options for selection of residential and non-residential remediation levels, nor increase the reliance upon site-specific risk assessments to determine alternative remediation levels. For instance, industrial properties are not required to remediate to levels that would be protective of children living on the site. The party conducting the remediation can decide to remediate to the more protective residential standards or the less protective non-residential standards, depending on the property’s intended use.

However, the property must be remediated to residential standards if the land use at the

time remediation is complete is residential.

The proposed rule continues to require the use of institutional or engineering controls when site concentrations exceed residential SRLs but meet non-residential pre-determined SRLs. Also, the rule allows the use of an institutional or engineering control to achieve an alternative site-specific SRL. However, due to A.R.S. §§ 49-152 and 49-158 enacted in 2000, the VEMUR is no longer a valid legal mechanism to administer these controls. This legislation clarified available options for property owners who clean up contaminated property for which the remediation is subject to Department approval. Institutional and engineering controls now require a DEUR to be implemented and maintained for sites meeting these criteria, thus replacing the VEMUR (see proposed R18-7-202).

Regardless of the choice to remediate to the pre-determined or site-specific standards, the conditions required for showing compliance with the selected standard have not changed. As before, any contaminants in the soil remaining after remediation cannot: 1) contaminate or threaten to contaminate groundwater or surface water in excess of water quality standards; 2) exhibit a hazardous waste characteristic of ignitability, corrosivity or reactivity; or 3) cause or threaten to cause an adverse impact to ecological receptors.

Applicability and Transition to New Standards

Neither the existing rule nor the proposed amendment requires soil remediation; they only provide standards which must be met in order to successfully complete remediation under Title 49. The requirement to perform soil remediation is found in the specific Title 49 statutes (e.g., the Water Quality Assurance Revolving Fund (WQARF) Program; the Underground Storage Tank (UST) Program; the Hazardous Waste Management Program; the Solid Waste Management Program; the Special Waste Management Program; the Aquifer Protection Permit Program. Additionally, the remediation standards apply to parties who voluntarily conduct soil remediation for the Greenfields Pilot Program and

the Voluntary Remediation Program. The appropriate regulatory program, not the soil remediation rule, determines which contaminants require remediation. Once the contaminant has been identified, the soil remediation rule establishes the remediation level for the contaminant.

There are two categories of persons who undertake remediation activities. The first category includes persons who have a legal duty to remediate under the Department's statutory authority (Title 49). Persons required to remediate contaminated soils under Title 49 authorities may be eligible to conduct their remediation under one of the Department's voluntary program, unless the actions are required pursuant to an enforcement action, or other limiting factors identified in § 49-172.

The second category includes those who voluntarily conduct remediation. The Department recognizes that it has no regulatory authority over a person who is either remediating a site which has been contaminated by means not regulated under Title 49, or a person who is not legally responsible for remediating the contamination under Title 49. A person in this category is a "volunteer." Even though there is no legal obligation to remediate, a person may request a letter from the Department indicating that the property has met the soil remediation standards. If these persons perform soil remediation activities under the Department's voluntary program, the requirements of this Article must be met.

The Department is aware of many instances where a person who is not a responsible party decides to conduct remediation outside the Department's jurisdiction. If a person is outside the Department's regulatory jurisdiction and no closure document from the Department is requested, remediation may be conducted without the Department's involvement or knowledge. In such a case, the soil remediation rule can be used as guidance.

This proposed amendment would end the applicability of the SRLs as published under the December 4, 1997 amendment after three years, and end applicability of the HBGLs (Health-based Guidance Levels) promulgated under the March 1996 Interim Emergency Soil Rule, immediately. Characterized sites which have initiated remediation or a risk assessment before the effective date of the proposed rule would have three years to meet the current 1997 SRLs, and the closure requirements of the applicable program.

Appendix A of the current soil rule contains the 1997 SRLs and is reproduced in the proposed rule as Appendix B. Proposed Appendix B has only been revised by technical correction of certain Chemical Abstract System (CAS) numbers. The proposed SRLs (listed as Appendix A of this proposed amendment) would apply to all sites not conducting remediation or a risk assessment at the time the rule becomes effective (see proposed R18-7-202). The soil cleanup levels do not extend to activities conducted pursuant to orders or other binding agreements that identify a cleanup standard entered into before the effective date of the rule. These orders and agreements are listed in the proposed rule, and been expanded from the original rule.

Specific Detailed Discussion of Proposed Rule Changes

Chemicals Renamed. For ease of identifying a chemical with related compounds and of recognition with the more commonly used names for chemicals, the following contaminants listed in the current rule are retained in the proposed SRL list under other names as noted: ethyl chloride is listed under the more commonly recognized name, chloroethane; hydrogen cyanide is listed under “cyanide, hydrogen” for ease of comparison to “cyanide, free”; chloral (CAS # 302-17-0) is present in the current SRL list but absent from the PRG list. Because the IRIS database specifically contains non-carcinogenic oral toxicity information for this compound under chloral hydrate, and there is suggestive evidence of human carcinogenicity when oral exposures occur, this chemical is retained in the proposed SRLs as chloral hydrate, rather than the anhydrous form currently listed; the 1,1- and 1,2- isomers of dimethyl hydrazine are listed under “hydrazine, dimethyl” due to indiscernible segregate toxicities, and methyl hydrazine is listed as “hydrazine, monomethyl” for comparative

purposes to the dimethyl form.

Chemicals Revised Due to Consolidation of Similar Salts or Isomers. Certain chemicals have their toxicity associated with the form which is available upon exposure to an individual. In the environment, these chemicals may be present as one or more very similar parent compounds with slight variations. An example of this is the variety of chemical forms for cyanides. The current SRLs include nine elemental forms of cyanide that would be consolidated by this proposed rule to a single proposed free cyanide SRL. This change is more practical as it is consistent with the reportable results provided by the laboratory method. The following SRLs are affected as follows: antimony and compounds is proposed to replace the pentoxide, potassium tartrate, tetroxide, and trioxide forms of antimony; free cyanide is proposed to replace the barium, calcium, chlorine, copper, potassium, potassium silver, silver, sodium, and zinc elemental forms of cyanide; thallium and compounds replace the oxide, acetate, carbonate, chloride, nitrate, selenite, and sulfate forms of thallium; and vanadium and compounds replaces vanadium pentoxide and sulfate.

PCBs. In order to be consistent with the latest toxicity studies, the proposed SRLs include PCBs under two categorical groups, for low-risk and for high-risk unspciated mixtures. Previously, PCBs were lumped under a single SRL, and assigned a single toxicity, for all varieties of PCB mixtures, typically referred to as Aroclors. An example of an unspciated, low-risk mixture is Aroclor 1016. Low-risk mixtures are those PCB formulations with low percentage chlorine content, and little to no polychlorinated dibenzofurans. High-risk mixtures are those PCB formulations with high percentage chlorine content, and the presence of polychlorinated dibenzofurans. For releases of multiple Aroclors, or PCBs of varying age subjected to weathering, speciation is an option for evaluating an alternative SRL.

Chemicals Not Listed Due to Impacts Limited to Air and/or Groundwater. ADEQ has determined that ammonia, hydrogen chloride, nitrate, and nitrite, which have a 1997 SRL, do

not warrant listing in the soil rule or do not warrant the determination of a single numeric soil cleanup value because they do not pose a significant health risk in soil. For example ammonia is listed in the current 1997 SRLs, but only listed in Region 9 PRGs for ambient air concentrations. Ammonia is highly transient in soil, as it rapidly volatilizes into air in surficial soils, and quickly oxidizes to nitrite and nitrate. Accordingly, ammonia is not listed as a chemical in the proposed rule; however, nitrite and nitrate are regulated under the proposed section R18-7-207 for ground water protection. Nitrite and nitrate in water are extremely toxic to newborns and children, and have significant impacts to aquatic organisms, but are a negligible health risk in soil.

Chemicals Deleted Due to Updated Toxicity Information. Since the last rule, toxicity data has been evaluated further or new information made available for some chemicals which do not provide an adequate basis for the quantitation of toxicity and/or the determination of a definitive adverse impact. For these chemicals, the toxicity factors formerly provided have been withdrawn from sources which are currently relied upon for toxicity determination, per US EPA guidance. As a result, retaining these chemicals in the SRLs is not supportable. The following SRLs are no longer listed in Appendix A: acetophenone, acifluorfen, 1,2-dichloroethylene mixture, methyl chlorocarbonate, cacodylic acid, and nitrapyrin. Only cacodylic acid, also known as dimethyl arsenate, has older toxicity data from NCEA still remaining. However, until the toxicity of organic forms of arsenic has been studied more fully, ADEQ will rely upon the arsenic SRL to address protection of human health.

Chemicals Added Due to New Toxicity Information. Since the last rule, additional toxicity studies have been conducted which warranted their use in the development of a toxicity factor, which is integral to the calculation of SRLs. The following new SRLs have been added to the list in Appendix A: aminodinitrotoluene, bromate, bromobenzene, butyl benzene (n-, sec-, and tert-), cyclohexane, 4,4'-dichlorobenzophenone, 1,3-dichloropropane, dicyclopentadiene, diisononyl phthalate, dimethylphenethylamine, N,N-diphenyl-1,4-benzenediamine, diphenyl sulfone, dysprosium, 1,6-hexamethylene diisocyanate, 2-

mercaptobenzothiazole, 4,4'-methylenediphenyl diisocyanate, methyl mercaptan, methyl phosphonic acid, 3- and 4-nitroaniline, nitroglycerin, 2-nitropropane, o-nitrotoluene, perchlorate, phenothiazine, o-phenylenediamine, p-phthalic acid, polychlorinated terphenyls, n-propyl benzene, 1,1'-sulfonylbis-(4-chlorobenzene), tetrahydrofuran, thiocyanate, titanium, tributyl phosphate, trimellitic anhydride, 1,2,4- and 1,3,5-trimethyl benzene, triphenylphosphine oxide, tris(2-chloroethyl) phosphate, tris(2-ethylhexyl) phosphate, and uranium.

Petroleum hydrocarbons. The proposed rule has eliminated the SRL listing for petroleum hydrocarbon mixtures, range C₁₀ – C₃₂. In the current rule, diesel No. 2 was used as the standard of toxicity for which all types of petroleum products are applied. This is not appropriate for sites other than diesel releases, and even for a diesel release is technically inaccurate once the release has occurred because the hundreds of chemical compounds which make up diesel are significantly altered throughout their migration in soil. Therefore, the proposed rule does not set a single numeric SRL value for the large spectrum of constituent variability encountered at all petroleum product release sites. Rather, the proposed rule provides for the cleanup of petroleum hydrocarbons by requiring cleanup of all the individual petroleum constituents detected in soil which have a proposed SRL. For example, depending on the type of product released, this may include PAHs, trimethyl benzenes, and MTBE. However, not all of the hundreds of chemical constituents have adequate toxicity data to establish an SRL. The agency believes that an adequate number of these petroleum compounds representing the significant portion of attributable toxicity do have proposed SRLs, and this approach is adequately protective of human health and the environment.

Lead. In the proposed rule, the residential SRL remains unchanged at 400 mg/kg. However, the non-residential SRL has been lowered from 2,000 mg/kg to 800 mg/kg. Consistent with the methodology of the current rule and US EPA, the proposed SRL for lead is determined differently than other SRLs using US EPA biokinetic modeling which estimates the blood lead level resulting from repeated exposures to lead. The Integrated

Exposure Uptake Biokinetic (IEUBK) model for childhood exposures is still utilized to determine the appropriate residential SRL, which remains as 400 mg/kg. However, US EPA has issued a version of the biokinetic modeling which more accurately assesses the blood level in adults exposed in the working environment. Using the most recent national census and health survey results of blood levels in adult women in the Adult Lead Model (ALM), the level in soil for non-residential uses of property has been revised from 2,000 mg/kg to 800 mg/kg. This change is based on protecting women of child-bearing age in the work environment, since fetuses and newborns are highly sensitive to the effects of lead. This is particularly important because more evidence indicates that early life exposures, even if discontinued, result in later life manifestations of health impacts such as neurological problems. If a site-specific remediation level is desired, the US EPA biokinetic model may be used in conjunction with the data from the national health survey for both racial/ethnic groups and the southwest regional quadrant of the nation, or the ALM adjusted for DEUR restricted exposure groups which do not include pregnant working adults. Alternatively, other biokinetic models may be used for shorter duration or highly variable exposures with supporting high quality site-specific data.

Chromium. Based on the lack of sufficient supporting evidence for total chromium to persist in the environment in the assumed 1:6 ratio of the hexavalent and trivalent forms (though it has been demonstrated to occur as such in the fumes and mists generated in the industrial chromium processing workplace), the current SRL for total chromium is proposed to be deleted. The agency believes that chromium toxicity should be based on the known and published toxicity factors determined for each form, rather than an assumed ratio for total chromium. Therefore, retaining the more technically supportable and protective SRLs for trivalent and hexavalent chromium is proposed.

Iron. Though Region 9 EPA has listed iron in the PRG list and it is ADEQ's goal to be consistent with Region 9 EPA practices, the agency believes that development of an SRL for iron is not warranted at this time. Available studies and information indicates limited toxicity, such that risk-based levels are approximately equivalent to levels of saturation in

soil and/or naturally occurring background.

Mercury. ADEQ has limited the SRLs for mercury to those for methyl mercury and “mercury and compounds”. The 1997 SRL lists mercury under mercuric chloride, elemental mercury, and methyl mercury. However, because elemental mercury exists as a liquid/vapor state, Region 9 EPA does not include it for soil. To simplify, all inorganic mercury compounds, regardless of solubility in soil/water environments, are listed under the proposed SRL for “mercury and compounds”. This does not deviate from the manner in which proposed SRLs for other metals are treated. If conditions at a site indicate that the more insoluble forms of inorganic mercury are present, a simple chemical speciation in conjunction with published bioavailability studies for the species present is adequate for demonstrating the protection of human health.

Manganese. Based on ADEQ’s evaluation of the available manganese toxicity information, ADEQ has elected to use the toxicity factor provided by the EPA IRIS database adjusted for intake from other sources such as soil. Region 9 EPA uses an approach that does adjust for intake from other sources, but the adjustment is applied by 2 methodologies. ADEQ applies only 1 adjustment method in accordance with EPA’s IRIS recommendations.

Perchlorate. ADEQ has selected the most recently available peer reviewed toxicity factor for use in calculating the SRL. At the time of publication of the October 2004 Region 9 PRGs, toxicity information was available only from EPA’s National Center for Exposure Assessment (NCEA) based on a health risk assessment conducted in 2002. Because of the widespread presence of perchlorate, previously unknown due to limits in laboratory method technology, and because of potential developmental impacts to the human fetus and newborns by inhibiting thyroid function, EPA requested the National Academy of Science (NAS) to develop a separate risk assessment for perchlorate. NAS issued this risk assessment in January 2002, and the toxicity factor resulting from the NAS evaluation was adopted by EPA and incorporated into the IRIS database of toxicity. The

SRL for perchlorate also applies to perchlorate salts, such as ammonium, lithium, potassium and sodium perchlorates.

Trichloroethylene (TCE). The agency has elected to be moderate by choosing neither the most or least stringent of the published TCE slope factors for use in calculating the SRL.

A selection is required because EPA has not finalized the TCE toxicity factors. The toxicity factors available include the withdrawn “old” IRIS EPA value (1989), the lower range “provisional” EPA value (2001), the upper range “provisional” EPA value (2001), and the California EPA value (2002). ADEQ has selected California EPA’s toxicity value which is closest to that of the old IRIS value, but not as stringent as either EPA provisional value. The agency has made this determination based on the available science, as well as the necessity of proceeding with a determination as the outcome of the current review process does not guarantee a final EPA value without further studies.

Definitions (R18-7-201). The proposed amendment to this section would remove the definitions for “Cancer Group,” “Greenfields Pilot Program,” “Voluntary Environmental Mitigation Use Restriction,” “Voluntary Remediation Program,” and “WQARF Voluntary Program.” The proposed amendment would modify the definitions for “Aquifer Protection Program,” “carcinogen,” “contaminant,” “engineering control,” “hazard quotient,” “nuisance,” “repository,” “site-specific human health risk assessment,” “soil,” “soil remediation level,” “solid waste management program,” “special waste management program,” and “water quality assurance revolving fund.” In addition, the proposed amendment would add new definitions for “child care facility,” “Declaration of Environmental Use Restriction,” “non-carcinogen,” and “school.” Many of the proposed deletions, modifications and additions are clarifications and corrections. Others are discussed earlier in this preamble.

Closure documents (R18-7-209). The proposed amendments to this section clarify that in addition to a “Letter of Completion,” alternative closure documents provided for by statute or rule can be used to document that the soil standards have been achieved. No

further action and LUST closure letters are examples of program-specific closure documents authorized by statute.

Notice of remediation and repository (R18-7-210). The proposed amendment to this section would clarify that a notice of remediation need not be submitted prior to a remediation that addresses a substantial and immediate endangerment to public health or the environment.

6. A reference to any study relevant to the rule that the agency reviewed and either relied on, or did not rely on in its evaluation of or justification for the proposed rules, where the public may obtain or review each study, all data underlying each study, and any analysis of each study and other supporting material:

- a. OSWER Directive 9285.7-53; “Human Health Toxicity Values in Superfund Risk Assessments”; USEPA; December 5, 2003; available from ADEQ and at <http://www.epa.gov/swerrims/riskassessment/pdf/hhmemo.pdf>
- b. “Region 9 Preliminary Remediation Goals (PRG) Table”; USEPA; December 28, 2004; available from ADEQ and at <http://www.epa.gov/region09/waste/sfund/prg/index.html>
- c. “PRG User’s Guide and Background Technical Document”; USEPA; October 27, 2004; available from ADEQ and at <http://www.epa.gov/region09/waste/sfund/prg/index.html>
- d. U.S. EPA. 2004. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Final. EPA/540/R-99/005. Office of Solid Waste and Emergency Response, Washington, D.C.; available from ADEQ and EPA.
- e. U.S. EPA. 2001. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, Interim Guidance. Office of Solid Waste and Emergency Response, Washington, D.C.; available from ADEQ and EPA.
- f. U.S. EPA. 1996. Soil Screening Guidance: Technical Background Document. EPA/540/R-95/128. Office of Solid Waste and Emergency Response, Washington,

D.C.; available from ADEQ and EPA.

- g. U.S. EPA. 2002. Blood Lead Concentrations of U.S. Adult Females: Summary Statistics From Phases 1 and 2 of the National Health and Nutrition Evaluation Survey (NHANES III). Office of Solid Waste and Emergency Response, Washington, D.C.; available from ADEQ and EPA.
- h. U.S. EPA. 2003. Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposure to Lead in Soil. EPA/540/R-03/001. Office of Solid Waste and Emergency Response, Washington, D.C.; available from ADEQ and EPA.

7. A showing of good cause why the rules are necessary to promote a statewide interest if the rules will diminish a previous grant of authority of a political subdivision of this state:

Not applicable

8. The preliminary summary of the economic, small business and consumer impact:

Costs and Benefits Not Fully Quantifiable. The Department believes that this rule amendment's benefits would outweigh its costs. This EIS is intended to fulfill the legal requirement for the current rulemaking. It is not possible to quantitatively estimate the costs and benefits of this amendment. This EIS qualitatively describes the costs and benefits of the amendment and attempts to weigh their relative value to determine whether the benefits are likely to outweigh the costs.

Effect of the Proposed Amendments.

The proposed rule uses the same formulas used to calculate the current SRLs, and keeps the same allowable risk with one exception. A more stringent risk level is required for remediation of contaminated sites used or currently intended to be used as a school or child care facility where children are likely to be in frequent and repeated contact with the contaminated soil.

The proposed rule updates contaminant SRLs with some contaminant levels increasing, and others decreasing. Approximately 65% of the chemicals have a proposed residential predetermined SRL within 20 percent of its current level, and approximately 75 percent of chemicals have a proposed non-residential predetermined SRL within 20 percent of its current level. Only 4 percent (20 out of 520 chemicals) of the proposed residential predetermined SRLs are an order of magnitude lower than their current level. Some contaminants were deleted and others added to the list. The overall impact on the cost and frequency of cleanup is difficult to estimate.

Data Limitations. The ability to conduct a traditional cost-benefit analysis that quantifies and monetizes the impacts of this rule is rendered difficult, if not impossible, by the fact that there is no such thing as a “typical” remediation site from which to draw inferences about the entire universe of existing remediation sites in Arizona. Contaminated sites are highly variable in size, physical and geological characteristics, contaminants, extent and concentration of contamination, the presence or absence of groundwater contamination, planned land use and many other variables that influence the cost of remediation. The availability of options under the rule makes it difficult to predict the standard a party will choose for a particular site, which also could significantly influence the cost of remediation.

Even the impact of different cleanup methods is difficult to predict. For instance, if the remediation approach selected is to excavate and dispose of contaminated soil, it is the mass of contaminated soil, more than the level of contamination that has the greatest influence on cost. Soil disposal usually is based on the tons of soil disposed.

Rather than employ speculative data that cannot be used meaningfully, the Department argues that the most crucial cost determinant is the cleanup standard that is chosen by the remediating party. Even if we assume that, as a rule, remediation to the more stringent standards will be more costly to achieve, it is difficult to estimate how many sites might be impacted. Many sites have more than one contaminant that exceeds the SRLs. The

contaminant for which the SRL is most difficult to achieve is referred to as the “driver.” The driver determines the remediation decisions, and the other contaminants are cleaned up incidental to the driver. So, while it might be possible to identify how many sites were contaminated with a given chemical, it would require detailed case-by-case analysis to determine if a new SRL changes the driver, thereby influencing remediation costs.

In addition, it is impossible to identify how the addition of an SRL for a chemical that does not currently have an SRL might impact cleanup costs. The Department has no standard procedure to track these contaminants.

In implementing this rule, ADEQ does not prescribe a particular cleanup standard for a site, unless the site is currently used for residential, but leaves the choice to the remediating party. The remediating party is given five choices to pursue: pre-determined residential or non-residential; site-specific residential or non-residential (through performing a risk assessment); or background. This allows regulated entities to control remediation decisions, considering remediation cost and other factors. Given the variability of site characteristics and the remediation choices available, it is impossible to predict the remediation costs. In the case of a site that is in residential use at the time of closure, the site must be remediated to a residential standard (predetermined or site specific) or to background.

Finally, it is not possible to quantify the impacts to human health or the environment. This rule is intended to result in better protection of human health and the environment. Basing the cleanup standards on updated information should achieve this end by reducing the uncertainty associated with determining risk, and by providing more scientifically accurate screening levels on which the Department can focus on the sites with the greater potential to adversely affect human health or the environment.

However, while the degree of protection provided is indicated by the risk level, the actual reduction in manifestation of health problems depends upon knowledge of the people

exposed, the duration and means of exposure, and the concentration of a contaminant at a site. Further, it is difficult to assign monetary value to many of the benefits of this amendment, such as reduced incidence of disease, reduced liability, improved quality of life, and improved community appearance.

The Department believes this rule meets the requirements of statute and that its benefits outweigh its costs.

A.R.S. §41-1055(B) REQUIREMENTS FOR AN EIS

B (2) PERSONS DIRECTLY AFFECTED BY THE RULE

Persons directly affected by the rule are:

1. Parties who remediate contaminated sites under A.R.S. Title 49;
2. Private businesses;
3. Landowners, lenders, and prospective purchasers of remediated sites;
4. State agencies involved in administering cleanup programs;
5. Political subdivisions of the State; and
6. Consumers, taxpayers; and the general public.

1. Parties Remediating Sites Under A.R.S Title 49

Responsible parties are persons or entities required to conduct soil remediation under Arizona law. A volunteer is any person who is not required by state law to remediate contaminated property, but wishes to do so voluntarily. Responsible parties and volunteers can be private citizens, businesses, state agencies or political subdivisions of the State. This may include anyone who owns contaminated property or was responsible for the contamination of the property, or anyone selling, buying or developing contaminated property. Some of the same considerations drive cleanup for volunteers and responsible parties; although, responsible parties may be compelled to cleanup as

required by law and may be more concerned with liability associated with property they have contaminated.

As described above, because some SRLs are increasing and some decreasing, some chemicals added to the SRL list and others dropped, and because the link between SRL and cleanup cost varies with site characteristics, it is impossible for the Department to estimate the impact of different SRLs on cleanup cost.

Some standards would increase, and others decrease under this propose rule. It is impossible to determine how many site cleanups might be “driven” by a chemical whose standard has increased or decreased. For this reason, it is impossible to predict the increase or decrease in risk assessments that might result from this amendment. Risk assessments are one option that a party might choose in developing cleanup levels. This choice is based on business considerations, to minimize remediation costs.

Setting more stringent allowable risk levels for remediating school and child care facility sites would likely increase the costs of, and frequency of, cleanups. However, the number of such sites is expected to be very small. As such, the aggregate cost of this change is expected to be small. Its magnitude is impossible to predict, for the reasons described above.

Using cleanup standards that are based on the most recent scientific knowledge will help reduce liability for damages associated with any contamination that may remain on a site after remediation. The Department cannot predict whether this reduced liability will have a significant economic impact on property value, insurance coverage costs or legal costs.

2. Private Businesses

Two types of businesses will be most impacted by this rule: 1) private businesses that are remediating sites under Title 49; and 2) private businesses, such as environmental

consulting firms and attorneys, providing remediation services. Private businesses remediating sites under Title 49 will incur the same costs and benefits described in the preceding section. The rule does not affect a remediation party's eligibility to receive reimbursement of remediation costs either from other responsible parties under WQARF or from the State Assurance Fund (SAF).

3. Landowners, Lenders, and Prospective Purchasers of Remediated Sites

Landowners, lenders, and prospective purchasers of remediated sites will be directly affected if they are remediating a site under Title 49 as described above. Landowners, lenders, and prospective purchasers may be impacted by reduced liability. Any increase in remediation cost is likely to be added to the purchase price of the property. Selling or purchasing property is a business decision, which the purchaser or seller judges will benefit them economically.

Using cleanup standards based on the most recent scientific knowledge will help reduce liability for damages associated with any contamination that may remain on the site after remediation. The Department cannot predict whether this reduced liability will have a significant economic impact on property value, insurance coverage costs or legal costs.

4. State Agencies

The Arizona Department of Environmental Quality is the agency responsible for implementation of this rule. The Arizona Department of Health Services (ADHS) provides consulting services on risk assessments under contract to the Department. Other state agencies will be affected if they remediate sites under Title 49 as described below.

The Department has contracted with ADHS to conduct risk assessments for the Department and to review the risk assessments submitted to Departmental programs. No incremental costs and benefits to ADHS are anticipated. The choice of whether to

perform a risk assessment is a business decision, which is judged to economically benefit the remediating party. It is impossible to determine whether responsible parties would choose the risk assessment option more frequently or less frequently as a result of the updated SRLs. Both instances are considered in the cost-benefit analyses below.

The Departmental programs that will implement this rule are: the UST Program; the Solid Waste and Special Waste Management Programs; the Hazardous Waste Management Program; the WQARF Program; the Aquifer Protection Permit Program; the Voluntary Remediation Program; the Greenfields Pilot Program; and any other program under Title 49 that regulates soil remediation. The staff in these programs already oversees current remediation efforts in the State. The Department expects that no new program staff will be hired and no new revenues generated as a result of this rulemaking.

However, there are costs to the Department associated with the rule, in informing the regulated community and training Departmental staff.

There are significant benefits associated with the rule. Because the proposed pre-determined SRLs are based on the best scientific evidence available to date, implementation of this rule will enable the Department to accomplish its mission of protecting public health and the environment more effectively. Risk-based standards, based on the best scientific information currently available, enables the Department to focus its efforts and those of the regulated community on remediating sites posing the greatest risk.

5. Political Subdivisions of the State

Political subdivisions will be affected if they remediate or compel remediation of sites under Title 49 as described below. In addition, remediated property will enhance development plans and will add value to the tax base.

Whenever soil contamination is remediated to non-residential standards, or an institutional or engineering control is used to meet cleanup standards, the property owner is required to file a DEUR with the relevant County Recorder's Office. County Recorder Offices throughout the State record DEURs. A nominal filing fee, determined by the County under its authority, is charged to the landowner. It is impossible to predict whether the number of DEURs filed will increase or decrease as a result of this proposed rule. In either case, the incremental impacts on County revenue and workload are expected to be small.

6. Consumers, Taxpayers and the General Public

Consumers, taxpayers, and the general public may be indirectly impacted by the rule. Any change in the cost of soil remediation resulting from changes to the remediation standards may be passed along to consumers of products produced by companies that are responsible parties or volunteers. Also there may be an incremental increase in overall property costs, but this is expected to be a minor factor when compared to inflation and other real estate market trends.

Taxes will not increase as a result of this amendment. Everyone benefits from using updated risk-based soil remediation standards based on recent scientific knowledge. The proposed SRLs would help ensure protection of human health and the environment and prioritize cleanups. It is difficult to assign a dollar value to such health, environmental and public policy benefits.

B(3) COST-BENEFIT ANALYSIS

COSTS TO THE IMPLEMENTING AGENCY – One-time costs to the Department for this amendment include the cost of the rulemaking process and the cost of informing staff and stakeholders about the amendment. The Department does not track the time spent on

individual rulemakings. The Department estimates that the cost for staff time to promulgate a typical rule could range from \$4,001 to \$15,672. This range does not include non-staff costs such as copies, supplies, postage, transportation to meetings, or phone calls, nor does it include non-Department costs, such as the costs to the Governor's Regulatory Review Council and the Secretary of State. A typical rule is non-controversial, of average complexity, and follows the standard rulemaking process. This rulemaking is more controversial and complex than a typical rulemaking, and as such, is expected to cost the Department more than a typical rulemaking.

After the rulemaking, the Department anticipates additional costs associated with increased questions from the public regarding the SRLs. The Department cannot predict the number of inquiries that may be received, or the staff resources that might be required to answer the questions. Therefore, the Department cannot estimate the potential costs of such inquiries. The Department may use its website, fact sheets and other outreach tools to inform the public about the amendments as needed.

BENEFITS TO THE IMPLEMENTING AGENCY - The Department has no incremental economic benefit as a result of this rule. Non-economic benefits to the Department result because SRLs based on recent scientific information supports the Department's mission.

COSTS TO THE ADHS - The ADHS, under an Inter-agency Service Agreement (ISA), sometimes reviews risk assessments. Whether the proposed rule results in increased or decreased risk assessments, there are no incremental costs to the ADHS as a result of this amendment, because, under the ISA, the Department must reimburse the ADHS at the rate in the ISA, for all risk assessment reviews.

BENEFITS TO THE ADHS - There are no incremental economic benefits to the ADHS, because the rate used by the ADHS, as agreed to in the ISA, does not include a profit margin. The ADHS realizes non-economic benefits by fulfilling its mission.

COSTS TO POLITICAL SUBDIVISIONS - It is not possible to quantitatively estimate the costs and benefits of this amendment for subdivisions of the State. Costs or savings to political subdivisions will be incurred if those political subdivisions are responsible parties or volunteers, as described above.

BENEFITS TO POLITICAL SUBDIVISIONS – Benefits for taxing subdivisions of the State are an expected and intended result of this amendment. Benefits are likely to include public health benefits, reduced liability and reduced legal costs. The Department can not predict the magnitude or value of these benefits.

COSTS TO PARTIES REMEDIATING SITES UNDER TITLE 49 - The economic benefits of this rulemaking may outweigh the costs for some sites, but for others, the costs may exceed the benefits. Many variables could impact this balance, including the property's characteristics, location, and proposed use and the business acumen of the developer. Projecting the costs and benefits for even one cleanup is very difficult, because many of these features are beyond the Department's control and ability to predict. Projecting the aggregate costs and benefits of incremental impacts on future cleanups is impracticable.

BENEFITS TO PARTIES REMEDIATING SITES UNDER TITLE 49 – The Department believes that, in the aggregate, benefits of this amendment outweigh the costs. Cleaning up contaminated sites is typically very expensive, several millions of dollars in some cases. The cost of developing property is likewise relatively expensive. The incremental increases in costs associated with the more restrictive SRLs in this amendment are expected to be small when compared to the overall project budget.

One major benefit of a cleanup that meets the SRLs is the reduced liability for future pollution claims. Benefits might also include increased property market value.

IMPACTS ON PUBLIC AND PRIVATE EMPLOYMENT

No incremental changes in public or private employment are foreseen as a result of this rule. The proposed rule itself will not create new jobs or destroy existing ones. Existing Department staff will continue to review and oversee site remediations; therefore, no new public sector employment positions are anticipated as a direct result of this amendment. If the number of risk assessments or DEURs changes as a result of the rule, some consulting companies may adjust their staffing levels. Such changes are difficult to estimate.

Any new jobs created by businesses that may be established, expanded or relocated will be the result of private business decisions. Aside from the employment benefits, other benefits in the form of income taxes paid by the employees, property taxes, sales, and unemployment and other taxes to be paid by the employer will accrue to various levels of government.

IMPACTS ON SMALL BUSINESSES

SMALL BUSINESSES SUBJECT TO THE RULE -- Some of the responsible parties and volunteers could be small business owners. The statute provides no basis for requiring cleanup to a certain level for some parties, and a different level for others. Because of this, the Department has not tried to isolate the impact on small businesses or to determine the number of responsible parties or volunteers that might be small businesses.

Some of the lenders, landowners and prospective purchasers could be small business owners. Likewise, some of the consulting firms could be small business owners. The Department believes these businesses would be impacted in the same way as large businesses, and that there would be no disproportionate impact on small businesses. The Department could find no rationale or generate any alternatives for reducing impact on small businesses.

The Department does not expect the incremental changes in cleanup costs due to the changes in the SRLs will be a determining factor in the decision of whether to develop or purchase a site. In general, if a business (small or otherwise) can afford to remediate a contaminated site, it can afford the incremental increase in costs that may occur as a result of this proposed rule.

ADMINISTRATIVE COSTS TO SMALL BUSINESSES -- There are no new administrative costs to small and other businesses imposed by this amendment. There are minimal administrative costs to any business subject to this rule, including small business. The administrative costs associated with remediating a contaminated site are not expected to change as a result of this amendment.

REDUCTION OF IMPACT ON SMALL BUSINESSES – A.R.S. § 41-1035 requires the Department to reduce the impact of a rule on the class of small businesses, if possible. The Department has determined that the statutes require the rule to apply to all entities performing remediation whether or not they are small businesses because cleanup levels are set based on adverse health effects from contamination regardless of the size of the responsible party. The Department exercised its discretion to reduce adverse impacts to all businesses, including small businesses by allowing the remediating party the option of selecting a predetermined standard, a site specific standard, or a background level.

The authorizing statute for this amendment does not provide a basis for promulgating a SRL for small businesses that is different from other entities. The statutory objectives, which are the basis of the rule, require the Department to establish cleanup standards that are protective of human health and the environment. The Department also is required to establish these standards based on the differing potential for occupants of the land to be exposed to contaminated soil at two types of property, residential and non-residential. The Department is proposing requirements in the rule that are no greater than those identified in the statute.

Individual businesses, including small businesses, may experience differing costs when complying with the rule. These differing costs will result from site-specific remediation characteristics (e.g., type of contaminant, land use). The rule allows all entities, including small businesses, to determine for themselves which standard and which method identified in the rule is the most cost effective to best meet their needs, and requirements given the site-specific remediation characteristics.

COSTS AND BENEFITS TO PRIVATE PERSONS

It is not possible to quantitatively estimate the costs and benefits of this amendment for the general public. This EIS qualitatively describes the costs and benefits to the general public, and attempts to weigh their relative value to determine whether the benefits are likely to outweigh the costs. The costs of remediation borne by responsible parties and volunteers will usually be passed on to their customers and consumers in general. On the other hand, the potential benefits to consumers are evident. Protective remediation, as is promoted by this rule, carries many public health benefits to people who live and work in the vicinity of contaminated sites. The health risks to exposed populations would be expected to diminish. The integrity of the environment would be maintained and, as such, the economic values of real properties, including those of adjacent property owners and homeowners, would be supported or restored.

PROBABLE EFFECTS ON STATE REVENUES

No new State revenues are projected. The proposed amendment is anticipated to have no effect on state revenues. Most, if not all, of the cash flow for remediation will occur between responsible parties and volunteers and remediation consulting companies. In the case of ADHS, revenue received for risk assessment services will merely reimburse the agency for costs incurred. No new net revenues are anticipated.

LESS INTRUSIVE OR LESS COSTLY ALTERNATIVES

No less intrusive or less costly alternatives were authorized by the legislature or contemplated by the Department. The SRL standards are based on principles accepted by the scientific community and EPA. Under the applicable statutory objectives discussed in this preamble and elsewhere, uniform standards must apply to all entities, whether they are public or private, small or large businesses. The question of costs revolves around contamination in site-specific cases, and what it costs to remediate the contamination. The Department has provided alternatives for selecting remediation standards. This flexibility allows parties to choose the option that is most appropriate and cost effective for their individual purposes.

9. The name and address of agency personnel with whom persons may communicate regarding the accuracy of the economic, small business, and consumer impact statement:

Name: Philip McNeely
Tank Programs Division
Telephone: (602) 771-7645 or (800) 234-5677, enter 771-7645 (Arizona only)
E-mail: McNeely.Philip @azdeq.gov

Name: Amanda Stone
Waste Programs Division
Telephone: (602) 771-4567; or (800) 234-5677, enter 771-4567 (Arizona only)
E-mail: Stone.Amanda @azdeq.gov

Fax: (602) 771-2302
TTD: (602) 771-4829
Address: Arizona Department of Environmental Quality
1110 W. Washington St.
Phoenix, Arizona 85007

10. The time, place and nature of the proceedings for the making, amendment, or repeal of the rules, or if no proceeding is scheduled, where, when and how persons may request an oral proceeding on the proposed rules:

Date: October 11, 2006
Time: 1:30 p.m.
Location: Arizona Dept. of Administration
100 N. 15th Ave., Room 300
Phoenix, AZ 85007

Date: October 12, 2006
Time: 1:30 p.m.
Location: Arizona Department of Environmental Quality
400 W. Congress, Room 444
Tucson, AZ 85701

Nature: Public hearings on the proposed rules, with opportunity for formal comments on the record. Please call (602) 771-4795 for special accommodations pursuant to the Americans with Disabilities Act.

The close of the written comment period will be at 5:00 p.m., October. 13, 2006. Submit comments to one of the individuals identified in item #4 of this proposed rule.

11. Any other matters prescribed by statute that are applicable to the specific agency or to any specific rule or class of rules.

Not applicable

12. Incorporations by reference and their location in the rules:

<u>Incorporated Material</u>	<u>Location</u>
“Guidelines for Cancer Risk Assessment”	R18-7-201

13. The full text of the rules follows:

TITLE 18. ENVIRONMENTAL QUALITY
CHAPTER 7. DEPARTMENT OF ENVIRONMENTAL QUALITY
REMEDIAL ACTION

ARTICLE 2. SOIL REMEDIATION STANDARDS

Section

R18-7-201. Definitions

R18-7-202. Applicability

R18-7-203. Remediation Standards

R18-7-204. Background Remediation Standards

R18-7-205. Pre-Determined Remediation Standards

R18-7-206. Site-Specific Remediation Standards

R18-7-207. Site-specific Remediation Standards for Nitrates and Nitrites

~~R18-7-207.~~ R18-7-208. Voluntary Environmental Mitigation Use Restriction (VEMUR)
Declaration of Environmental Use Restriction (DEUR)

~~R18-7-208.~~ R18-7-209. Letter of Completion or Alternative Closure Document

~~R18-7-209.~~ R18-7-210. Notice of Remediation and Repository

Appendix A. 2006 Soil Remediation Levels (SRLs)

~~Appendix A.~~ B. 1997 Soil Remediation Levels (SRLs)

~~Appendix B. Notice of Voluntary Environmental Mitigation Use Restriction by Owner or Owners~~

~~Appendix C. Cancellation of Voluntary Environmental Mitigation Use Restriction by Owner or Owners~~ Repealed

R18-7-201. Definitions

In addition to the definitions provided in A.R.S. §§ 49-151 and 49-152, the following definitions apply in this Article:

1. “Aquifer Protection Permit Program” means the system of requirements prescribed in A.R.S. Title 49, Chapter 2, Article 3 and A.A.C. Title 18, Chapter 9, ~~Article 4~~ Articles 1 through 7.
2. “Background” means a concentration of a naturally occurring contaminant in soils.
3. ~~“Cancer Group” means a category of chemicals listed by a weight of evidence assessment by the United States Environmental Protection Agency to evaluate human carcinogenicity. Based on this evaluation, chemicals are placed in 1 of the following categories: A—known human carcinogen; B1 or B2—probable human carcinogen; C—possible human carcinogen; D—not classified as to human carcinogenicity; and E—evidence of non-carcinogenicity in humans.~~
- 4.3. “Carcinogen” or “carcinogenic” means a contaminant which the potential of a chemical to cause cancer in humans as determined by lines of evidence in accordance with a narrative classification in “Guidelines for Cancer Risk Assessment”, EPA/630/P-03/001F, March 2005, (and no future editions) which is incorporated by reference. “Guidelines for Cancer Risk Assessment” is available from ADEQ and at <http://cfpub.epa.gov/ncea/cfm/recorddisplay.cfm?deid=116283>. ~~has a cancer group designation of Class A, B1, B2, or C, but does not include a substance having cancer group designations D or E. The cancer group designation is found in Appendix A to the rule.~~
4. “Child Care Facility” means any permanent facility on a property or portion of property in which care or supervision is provided for children below the age of 18, unaccompanied by a parent or guardian, for periods of less than twenty-four hours per day. Child care facility does not include private homes or facilities that care for less than five children.
5. “Contact” means exposure to a contaminant through ingestion, inhalation, or dermal absorption.

6. “Contaminant” means a substance regulated by the programs listed in R18-7-202(A) or R18-7-202(B) and A.R.S. § 49-171(2).
7. “Department” means the Arizona Department of Environmental Quality.
8. “Deterministic Risk Assessment Methodology” means a site-specific human health risk assessment, performed using a specific set of input variables, exposure assumptions, and toxicity criteria, represented by point estimates for each receptor evaluated, which results in a point estimate of risk.
9. “Declaration of Environmental Use Restriction” or “DEUR” means a restrictive covenant as described in A.R.S. § 49-152.
- ~~9.~~10. “Ecological Community” means an assemblage of populations of different species within a specified location in space and time.
- ~~10.~~11. “Ecological Receptor” means a specific ecological community, population, or individual organism, protected by federal or state laws and regulations, or a local population which provides an important natural or economic resource, function, and value.
- ~~11.~~12. “Ecological Risk Assessment” is a scientific evaluation of the probability of an adverse effect to ecological receptors from exposure to specific types and concentrations of contaminants. An ecological risk assessment contains 4 components: identification of potential contaminants; an exposure assessment; a toxicity assessment; and a risk characterization.
- ~~12.~~13. “Engineering Control” means a remediation method such as a barrier or cap that is used to prevent or minimize exposure to contaminants, and includes technologies that reduce the mobility or migration of contaminants.
- ~~13.~~14. “Excess Lifetime Cancer Risk” means the increased risk of developing cancer above the background cancer occurrence levels due to exposure to contaminants.
- ~~14.~~15. “Exposure” means contact between contaminants and organisms.
- ~~15.~~16. “Exposure Pathway” means the course a contaminant takes from a source to an exposed organism. Each exposure pathway includes a source or release from a source, an exposure point, and an exposure route. If the exposure point differs from the source, transport/exposure media (that is, air, water) are also included.

- ~~16.~~17. “Exposure Point” means a location of potential contact between a contaminant and an organism.
- ~~17.~~18. “Exposure Route” means the way a contaminant comes into contact with an organism (that is, by ingestion, inhalation, or dermal contact).
- ~~18. “Greenfields Pilot Program” means the system of requirements prescribed in Laws 1997, Ch. 296, § 11.~~
19. “Groundwater” means water in an aquifer as defined in A.R.S. § 49-201(2).
20. “Hazard Index” means the sum of hazard quotients for multiple substances and/or multiple exposure pathways, or the sum of hazard quotients for chemicals acting by a similar mechanism and/or having the same target organ.
21. “Hazardous Waste Management Program” means the system of requirements prescribed in A.R.S. Title 49, Ch. 5, Article 2 and 18 A.A.C. 8, Article 2.
22. “Hazard Quotient” means the value which quantifies non-carcinogenic risk for ± one chemical for ± one receptor population for ± one exposure pathway over a specified exposure period. The hazard quotient is equal to the ratio of a chemical-specific intake to the reference dose.
23. “Imminent and substantial endangerment to the public health or the environment” has the meaning found in A.R.S. § 49-282.02(C)(1).
24. “Institutional control” means a legal or administrative tool or action taken to reduce the potential for exposure to contaminants.
25. “Letter of Completion” means a Departmental statement which indicates whether the property in question has met the soil remediation standards set forth in this Article.
26. “Migrate” or “Migration” means the movement of contaminants from the point of release, emission, discharge, or spillage: through the soil profile; by volatilization from soil to air and subsequent dispersion to air; and by water, wind, or other mechanisms.
27. “Non-carcinogen” means a chemical that has the potential upon exposure to an individual to cause adverse health effects other than cancer.
- ~~27.~~28. “Non-Residential Site-Specific Remediation Level” means a level of contaminants remaining in soil after remediation which results in a cumulative excess lifetime cancer

- risk between 1×10^{-6} and 1×10^{-4} and a Hazard Index no greater than 1 based on non-residential exposure assumptions.
- ~~28.~~29. “Nuisance” means the activities or conditions which may be subject to A.R.S. §§ 49-141 and ~~49-104(A)(11)~~.
- ~~29.~~30. “Person” means any public or private corporation, company, partnership, firm, association or society of persons, the federal government and any of its departments or agencies, this state or any of its agencies, departments, political subdivisions, counties, towns, municipal corporations, as well as a natural person.
- ~~30.~~31. “Population” means an aggregate of individuals of a species within a specified location in space and time.
- ~~31.~~32. “Probabilistic Risk Assessment Methodology” means a site-specific human health risk assessment, performed using probability distributions of input variables and exposure assumptions which take into account the variability and uncertainty of these values, which results in a range or distribution of possible risk estimates.
- ~~32.~~33. “Reasonable Maximum Exposure” or “RME” means the highest human exposure case that is greater than the average, but is still within the range of possible exposures to humans at a site.
- ~~33.~~34. “Remediate” or “remediation” has the meaning found in A.R.S. § 49-151(~~2~~).
35. “Reference dose” means the toxicity factor expressed as a threshold level in units of (mg/kg-day) at which non-cancer effects are not expected to occur.
- ~~34.~~36. “Repository” means the Department's database, established under A.R.S. § 49-152(~~D~~) (E), from which the public may view information pertaining to remediation projects ~~for which a Notice of Remediation has been submitted or a Letter of Completion has been issued.~~
- ~~35.~~37. “Residential Site-Specific Remediation Level” means a level of contaminants remaining in the soil after remediation which results in a cumulative excess lifetime cancer risk between 1×10^{-6} and 1×10^{-4} and a Hazard Index no greater than 1 based on residential exposure assumptions.
- ~~36.~~38. “Residential Use” has the meaning found in A.R.S. § 49-151(~~3~~).

39. “School” means any public or non-public institution under the jurisdiction of the Arizona State Board of Education and established for the purposes of offering instruction to children attending any grade from preschool through grade twelve.
- 37.40. “Site-Specific Human Health Risk Assessment” is a scientific evaluation of the probability of an adverse effect to human health from exposure to specific types and concentrations of contaminants. A site-specific human health risk assessment contains 4 four components: identification of potential contaminants; an exposure assessment; a toxicity assessment; and a risk characterization.
- 38.41. “Soil” means all earthen materials including moisture and pore space contained within earthen material, located between the land surface and groundwater including sediments and unconsolidated accumulations produced by the physical and chemical disintegration of rocks.
- 39.42. “Soil Remediation Level” or “SRL” means a pre-determined risk-based standard based upon the total contaminant concentration in soil, developed ~~by the Arizona Department of Health Services~~ pursuant to A.R.S. § 49-152(A)(1)(a) and listed in Appendix A or, as applicable, in Appendix B.
- 40.43. “Solid Waste Management program” means the system of requirements prescribed in A.R.S. Title 49, Ch. 4, ~~Article 4~~ and the rules adopted under those statutes.
- 41.44. “Special Waste Management program” means the system of requirements prescribed in A.R.S. Title 49, Ch. 4, Article 9 and 18 A.A.C. 8 13, Article 3 Articles 13 and 16.
- 42.45. “Underground Storage Tank program” or “UST program” means the system of requirements prescribed in A.R.S. Title 49, Ch. 6, Article 1 and 18 A.A.C. 12.
43. ~~“Voluntary Environmental Mitigation Use Restriction” or “VEMUR” means, pursuant to A.R.S. § 49-152(B), a written document, signed by the real property owner and the Department, and recorded with the county recorder on the chain of title for a particular parcel of real property, which indicates that a remediation to a level less protective than residential standards has been completed and, unless subsequently canceled, that the owner agrees to restrict the property to non-residential uses.~~
44. ~~“Voluntary Remediation Program” means the system of requirements prescribed in A.R.S. § 49-104(A)(17).~~

~~45.~~46. “Water Quality Assurance Revolving Fund” or “WQARF” means the system of requirements prescribed in A.R.S. Title 49, Ch. 2, Article 5 and 18 A.A.C. 7, ~~Article 1~~ 16.

~~46. “WQARF Voluntary Program” means the system of requirements prescribed in A.R.S. §§ 49-282.05 and 49-285(B).~~

R18-7-202. Applicability

A. This Article applies to a person legally required to conduct soil remediation by any of the following regulatory programs administered by the Department:

1. The Aquifer Protection Permit Program.
2. The Hazardous Waste Management Program.
3. The Solid Waste Management Program.
4. The Special Waste Management Program.
5. The Underground Storage Tank Program.
6. The Water Quality Assurance Revolving Fund.
7. Any other program under A.R.S. Title 49 that regulates soil remediation.

B. This Article also applies to a person who is not legally required to conduct soil remediation, but who chooses to do so under any ~~of the following programs~~ program administered by the Department:

- ~~1. The Greenfields Pilot Program.~~
- ~~2. The Voluntary Remediation Program.~~
- ~~3. The WQARF Voluntary Program.~~

C. The requirements of this Article apply in addition to any specific requirements of the programs described in subsections (A) or (B).

D. This Article is limited to soil remediation.

E. ~~A person who is remediating soil at a site which was characterized before the effective date of this Article shall comply with either the Soil Remediation Standards adopted as an interim rule on March 29, 1996, or the Soil Remediation Standards adopted in this Article.~~ A person who is remediating a site shall comply with the numeric soil remediation standards identified in either Appendix A or Appendix B if both of the following conditions are met:

1. The site has been characterized before the effective date of this rule.
 2. The site is remediated or a risk assessment has been completed within 3 years after the effective date of this rule. A site is considered characterized when the laboratory analytical results of the soil samples delineating the nature, degree, and extent of soil contamination have been received by the person conducting the remediation. A risk assessment or remediation is considered completed when site closure, that meets the conditions set forth in R18-7-209, has been requested. If either subsection (1) or subsection (2) is not met, a person who is remediating a site shall comply with the numeric soil remediation standards identified in Appendix A.
- F. Nothing in this Article limits the Department's authority to establish more stringent soil remediation levels in response to:
1. A nuisance.
 2. An imminent and substantial endangerment to the public health or the environment.
- G. This Article does not apply to persons remediating soil to numeric soil remediation levels specified in ~~orders of the Director or orders of any Court that have been entered~~ the following documents and entered into, issued or approved before the effective date of this Article rule:
1. Orders of the Director;
 2. Orders of any Court;
 3. Work agreements approved by the Director pursuant to A.R.S. § 49-282.05;
 4. Closure plans approved by the Director pursuant to R18-8-265;
 5. Post-closure permits approved by the Director pursuant to R18-8-270;
 6. Records of Decision approved by the Director pursuant to R18-16-410;
 7. Records of Decision approved by the Director pursuant to R18-16-413; and
 8. Records of Decision approved by the Director pursuant to 40 CFR 300.430(f)(5).

R18-7-203. Remediation Standards

- A. A person subject to this Article shall remediate soil so that any concentration of contaminants remaining in the soil after remediation is less than or equal to ~~1~~ one of the following:

1. The background remediation standards prescribed in R18-7-204.
 2. The pre-determined remediation standards prescribed in R18-7-205.
 3. The site-specific remediation standards prescribed in R18-7-206.
- B.** A person who conducts a soil remediation based on the standards set forth in R18-7-205, ~~or~~ R18-7-206, or R18-7-207 shall remediate soil so that any concentration of contaminants remaining in the soil after remediation does not:
1. Cause or threaten to cause a violation of Water Quality Standards prescribed in A.A.C. Title18, Chapter 11. If the remediation level for a contaminant in the soil is not protective of aquifer water quality and surface water quality, the person shall remediate soil to an alternative soil remediation level that is protective of aquifer water quality and surface water quality.
 2. Exhibit a hazardous waste characteristic of ignitability, corrosivity, or reactivity as defined in A.A.C. R18-8-261(A). If the remediation level for a contaminant in the soil results in leaving soils that exhibit a hazardous waste characteristic other than toxicity, the person shall remediate soil to an alternative soil remediation level such that the soil does not exhibit a hazardous waste characteristic other than toxicity.
 3. Cause or threaten to cause an adverse impact to ecological receptors. If the Department determines that the remediation level for a contaminant in soil may impact ecological receptors based on the existence of ecological receptors and complete exposure pathways, the person shall conduct an ecological risk assessment. If the ecological risk assessment indicates that any concentration of contaminants remaining in the soil after remediation causes or threatens to cause an adverse impact to ecological receptors, the person shall remediate soil to an alternative soil remediation level, derived from the ecological risk assessment, that is protective of ecological receptors.
- C.** The Department may estimate total contaminant concentration in soil using soil vapor concentrations.

R18-7-204. Background Remediation Standards

- A.** A person may elect to remediate to a background concentration for a contaminant.

- B.** A person who conducts a remediation to a background concentration for a contaminant shall establish the background concentration using all of the following factors:
1. Site-specific historical information concerning land use.
 2. Site-specific sampling of soils unaffected by a release, but having characteristics similar to those of the soils affected by the release.
 3. ~~A statistical~~ Statistical analysis of the background concentrations using the 95th percentile upper confidence limit.

R18-7-205. Pre-Determined Remediation Standards

- A.** A person may elect to remediate to the residential or non-residential Soil Remediation Levels (SRLs) set forth in Appendix A. If allowed under R18-7-202(E), a person may also elect to remediate to the residential or non-residential SRLs in Appendix B.
- B.** A person who conducts ~~an SRL-based~~ remediation pursuant to this Article shall remediate to the residential SRL on any property where there is residential use at the time remediation is completed.
- C.** A pre-determined contaminant standard established by federal law or regulation may be used for polychlorinated biphenyl cleanups regulated pursuant to the Toxic Substances Control Act (TSCA) at 40 CFR 761.120 et seq., however, the Department has no regulatory authority to issue a Letter of Completion in TSCA-regulated cleanups.
- D.** A person who elects to utilize a residential or non-residential SRL for the following known human carcinogens shall remediate to a 1×10^{-6} excess lifetime cancer risk: benzene, benidine, bis (chloromethyl) ether, chromium VI, diethylstilbestrol, direct black 38, direct blue 6, direct brown 95, nickel subsulfide and vinyl chloride.
- E.** Except as provided below, a person who elects to remediate to a residential SRL, may utilize a 1×10^{-5} excess lifetime cancer risk for any human carcinogen other than a known human carcinogen. If the current or currently intended future use of the contaminated site is a child care facility or school where children below the age of 18 are reasonably expected to be in frequent, repeated contact with the soil, the person conducting remediation shall remediate to a 1×10^{-6} excess lifetime cancer risk.

- F.** For contaminants that exhibit both carcinogenic and non-carcinogenic effects, the numeric standard that is lower shall apply.

R18-7-206. Site-Specific Remediation Standards

- A.** A person may elect to remediate to a residential or a non-residential site-specific remediation level derived from a site-specific human health risk assessment.
- B.** A person who conducts a remediation to a residential or a non-residential site-specific remediation level shall use + one of the following site-specific human health risk assessment methodologies:
1. A deterministic methodology. If a deterministic methodology is used, reasonable maximum exposures shall be evaluated for future use scenarios.
 2. A probabilistic methodology. If a probabilistic methodology is used, it shall be no less protective than the 95th percentile upper bound estimate of the distribution.
 3. An alternative methodology commonly accepted in the scientific community. An alternative methodology is considered accepted in the scientific community if it is published in peer-reviewed literature, such as a professional journal or publication of standards of general circulation, and there is general consensus within the scientific community ~~about~~ that the methodology is sound.
- C.** A person who conducts a remediation to a site-specific remediation level shall remediate to the residential site-specific remediation level on any property where there is residential use at the time remediation is completed.
- ~~D.~~** ~~With prior approval of the Department, a person may achieve the site-specific remediation levels based on the use of institutional and engineering controls. The approval shall be based, in part, on the demonstration that the institutional and engineering controls will be maintained.~~
- E.D.** A person conducting a remediation to a residential or a non-residential site-specific remediation level shall remediate the contaminants in soil to a Hazard Index no greater than 1 to and a cumulative excess lifetime cancer risk between 1×10^{-6} and 1×10^{-4} ~~and a Hazard Index of no greater than one taking into account the factors enumerated in this subsection.~~

~~The person conducting a remediation, and the Department prior to issuing a Letter of Completion, shall select the excess lifetime cancer risk between 1×10^{-6} and 1×10^{-4} based upon the following site specific factors:~~ The following site-specific factors shall be evaluated when determining the cumulative excess lifetime cancer risk:

1. The presence of multiple contaminants.
2. The existence of multiple pathways of exposure.
3. The uncertainty of exposure.
4. The sensitivity of the exposed population.
5. Other program-related laws and regulations that may apply.

R18-7-207. Site-specific Remediation Standards for Nitrates and Nitrites

A person who conducts remediation of nitrates or nitrites shall remediate to a site specific remediation level pursuant to R18-7-203(B)(1), (2) and (3).

R18-7-207.R18-7-208. Voluntary Environmental Mitigation Use Restriction (VEMUR) Declaration of Environmental Use Restriction (DEUR)

- A.** ~~A person who remediates to the non-residential SRL, or to the non-residential site specific remediation level shall submit the information listed in R18-7-208(A)(1) through (5) and a VEMUR signed by the real property owner, as set forth in Appendix B, to the applicable Departmental program listed in R18-7-202(A) or R18-7-202(B). The VEMUR shall be formatted in accordance with A.R.S. § 11-480 and any other specific requirements of the County Recorder of the jurisdiction.~~ A property owner who elects to leave contamination on a property that exceeds the applicable residential standard for the property under R18-7-205 or R18-7-206, or elects to use an institutional control or an engineering control to meet the requirements of R18-7-205, R18-7-206 or R18-7-207, shall record a DEUR pursuant to A.R.S. § 49-152 and comply with the related provisions of that statute, and the rules promulgated thereunder.
- B.** ~~The applicable Departmental program listed in R18-7-202(A) or R18-7-202(B) shall evaluate the complete information described in R18-7-207(A) and verify whether the non-residential SRL or the non-residential site specific remediation level has been achieved. An~~

authorized Departmental representative shall either sign the VEMUR submitted pursuant to subsection (A) of this Section and return the signed VEMUR by certified mail, or request additional information to make the verification.

- C.** A person described in R18-7-207(A) shall record a VEMUR described in R18-7-207(B) with the County Recorder's office where the property is located within 30 calendar days of receipt of the VEMUR signed by the authorized Departmental representative, as evidenced by the return receipt.
- D.** A real property owner who remediates to the background concentration of a contaminant, to the residential SRL, or to the residential site specific remediation level and who wishes to cancel a recorded VEMUR shall submit the information required in R18-7-208(A)(1) through (5) and a signed VEMUR Cancellation, as set forth in Appendix C, to the applicable Departmental program listed in R18-7-202(A) or R18-7-202(B). The VEMUR Cancellation shall be formatted in accordance with A.R.S. § 11-480 and any other specific requirements of the County Recorder of the jurisdiction.
- E.** The applicable Departmental program listed in R18-7-202(A) or R18-7-202(B) shall evaluate the complete information described in R18-7-207(D) and verify whether the background concentration, the residential SRL, or the residential site specific remediation level has been achieved. An authorized Departmental representative shall either sign the VEMUR Cancellation submitted pursuant to R18-7-207(D) and return the VEMUR Cancellation via certified mail, or request additional information to make the verification.
- F.** A person who records a document described in R18-7-207 shall provide a copy of the recorded document to the applicable Departmental program described in R18-7-202(A) or R18-7-202(B) within 30 calendar days of the date of recording.

R18-7-208, R18-7-209. Letter of Completion or Alternative Closure Document

- A.** If a person requests a Letter of Completion or an alternative closure document, a person shall submit, at a minimum, the following information to the applicable Departmental program listed in R18-7-202(A) or described in R18-7-202(B):

1. A description of the actual activities, techniques, and technologies used to remediate soil at the site, including the legal mechanism in place to ensure that any institutional and engineering controls are maintained.
 2. Documentation that requirements prescribed in R18-7-203(A) and R18-7-203(B)(1) and (2) have been satisfied.
 3. If the Department determines pursuant to R18-7-203(B)(3) that an ecological risk assessment is required, documentation that the requirements prescribed in R18-7-203(B)(3) have been satisfied.
 4. Soil sampling analytical results which are representative of the area which has been remediated, including documentation that the laboratory analysis of samples has been performed by a laboratory licensed by the Arizona Department of Health Services under A.R.S. § 36-495 et seq. and 9 A.A.C. 14, Article 6.
 5. A statement signed by the person conducting the remediation certifying the following: I certify under penalty of law that this document and all attachments are, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of a fine and imprisonment for knowing violations.
- B.** The applicable Departmental program described in R18-7-202(A) or R18-7-202(B) ~~shall~~ may evaluate the information described in ~~R18-7-208(A)~~ ~~R18-7-209(A)~~ and ~~R18-7-207(F)~~ to verify The Department may request additional information, or if the Department verifies compliance with the soil remediation standards set forth under this Article and closure requirements of the applicable program or programs identified in R18-7-202(A) or described in R18-7-202(B), the Department shall issue a Letter of Completion or request additional information, or an alternative closure document provided for by statute or rule that certifies the soil standards of this rule have been achieved.
- C.** The applicable Departmental program ~~listed in~~ described in R18-7-202(A) or R18-7-202(B) may revoke or amend any Letter of Completion or alternative closure document described in R18-7-209(B) if any of the information submitted pursuant to ~~R18-7-208(A)~~ and R18-7-209(A) ~~and R18-7-207(F)~~ is inaccurate or if any condition was unknown to the Department when the Department issued the Letter of Completion or alternative closure document.

~~R18-7-209.~~R18-7-210.

Notice of Remediation and Repository

- A. A person conducting soil remediation shall submit a Notice of Remediation to the applicable Departmental program listed in R18-7-202(A) or R18-7-202(B) prior to beginning remediation. A person conducting a soil remediation to address an immediate and substantial endangerment to public health or the environment and during an emergency who has notified the Department in accordance with ~~emergency~~ notification requirements prescribed in A.R.S. § 49-284 is not required to submit a Notice of Remediation prior to beginning remediation. Any person who continues ~~or initiates~~ a soil remediation after the immediate and substantial endangerment has been abated ~~initial emergency response~~ shall submit a Notice of Remediation. A Notice of Remediation shall include all of the following information:
1. The name and address of the real property owner;
 2. The name and address of the remediating party;
 3. A legal description and street address of the property;
 4. A list of each contaminant to be remediated;
 5. The background concentration, SRL, or site-specific remediation level selected to meet the remediation standards;
 6. A description of the current and post-remediation property use as either residential or non- residential;
 7. The rationale for the selection of residential or non-residential remediation; and
 8. The proposed technologies for remediating the site.
- B. The Department shall ~~establish and~~ maintain a repository available to the public for information regarding sites where soil is remediated. The Repository shall include a listing of sites for which a Notice of Remediation has been submitted or a Letter of Completion or alternative closure document has been issued.
1. For sites where a Notice of Remediation has been filed, the Repository shall contain the date the notice was filed and the information submitted as described in ~~R18-7-209(A)~~ R18-7-210(A).
 2. For sites where a Letter of Completion or alternative closure document has been issued, the Repository shall contain the following:

- a. The name and address of the real property owner;
 - b. The name and address of the remediating party.
 - c. A legal description and street address of the property;
 - d. A listing of each contaminant that was remediated;
 - e. The background concentration, SRL, or site-specific remediation level selected to meet the remediation standard;
 - f. A description whether the residential or non-residential standard was achieved;
 - g. A description of any engineering or institutional control used to remediate the site; and
 - h. The date when the Letter of Completion or alternative closure document was issued.
3. ~~The Repository will be available for public review during the Department's normal business hours. A person who wishes to obtain copies of the Repository shall pay a copying fee established by the Department.~~

Appendix A. 2006 Soil Remediation Levels (SRLs)

CONTAMINANT	CASRN	Class	Residential (mg/kg)			Non-residential (mg/kg)
			Carcinogen		Non-carcinogen	
			10 ⁻⁶ Risk	10 ⁻⁵ Risk		
Acephate	30560-19-1	ca, nc	63	630	240	2,000
Acetaldehyde	75-07-0	ca, nc	11	110	50	160
Acetochlor	34256-82-1	nc			1,200	12,000
Acetone	67-64-1	nc			14,000	54,000
Acetone cyanohydrin	75-86-5	nc			49	490
Acetonitrile	75-05-8	nc			420	1,800
Acrolein	107-02-8	nc			0.10	0.34
Acrylamide	79-06-1	ca, nc	0.12	1.2		3.8
Acrylic acid	79-10-7	nc			29,000	270,000
Acrylonitrile	107-13-1	ca, nc	0.21	2.1		4.9
Alachlor	15972-60-8	ca, nc	6.8	68		210
Alar	1596-84-5	nc			9,200	92,000
Aldicarb	116-06-3	nc			61	620
Aldicarb sulfone	1646-88-4	nc			61	620

CONTAMINANT	CASRN	Class	Residential (mg/kg)			Non-residential (mg/kg)
			Carcinogen		Non-carcinogen	
			10 ⁻⁶ Risk	10 ⁻⁵ Risk		
<u>Aldrin</u>	<u>309-00-2</u>	<u>ca, nc</u>	<u>0.032</u>	<u>0.32</u>		<u>1.0</u>
<u>Ally</u>	<u>74223-64-6</u>	<u>nc</u>			<u>15,000</u>	<u>150,000</u>
<u>Allyl alcohol</u>	<u>107-18-6</u>	<u>nc</u>			<u>310</u>	<u>3,100</u>
<u>Allyl chloride</u>	<u>107-05-1</u>	<u>nc</u>			<u>18</u>	<u>180</u>
<u>Aluminum</u>	<u>7429-90-5</u>	<u>nc</u>			<u>76,000</u>	<u>920,000</u>
<u>Aluminum phosphide</u>	<u>20859-73-8</u>	<u>nc</u>			<u>31</u>	<u>410</u>
<u>Amdro</u>	<u>67485-29-4</u>	<u>nc</u>			<u>18</u>	<u>180</u>
<u>Ametryn</u>	<u>834-12-8</u>	<u>nc</u>			<u>550</u>	<u>5,500</u>
<u>Aminodinitrotoluene</u>	<u>1321-12-6</u>	<u>nc</u>			<u>12</u>	<u>120</u>
<u>m-Aminophenol</u>	<u>591-27-5</u>	<u>nc</u>			<u>4,300</u>	<u>43,000</u>
<u>4-Aminopyridine</u>	<u>504-24-5</u>	<u>nc</u>			<u>1.2</u>	<u>12</u>
<u>Amitraz</u>	<u>33089-61-1</u>	<u>nc</u>			<u>150</u>	<u>1,500</u>
<u>Ammonium sulfamate</u>	<u>7773-06-0</u>	<u>nc</u>			<u>12,000</u>	<u>120,000</u>
<u>Aniline</u>	<u>62-53-3</u>	<u>ca, nc</u>	<u>96</u>	<u>960</u>	<u>430</u>	<u>3,000</u>
<u>Antimony and compounds</u>	<u>7440-36-0</u>	<u>nc</u>			<u>31</u>	<u>410</u>
<u>Apollo</u>	<u>74115-24-5</u>	<u>nc</u>			<u>790</u>	<u>8,000</u>
<u>Aramite</u>	<u>140-57-8</u>	<u>ca, nc</u>	<u>22</u>	<u>220</u>		<u>690</u>
<u>Arsenic</u>	<u>7440-38-2</u>	<u>ca, nc</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
<u>Assure</u>	<u>76578-12-6</u>	<u>nc</u>			<u>550</u>	<u>5,500</u>
<u>Asulam</u>	<u>3337-71-1</u>	<u>nc</u>			<u>3,100</u>	<u>31,000</u>
<u>Atrazine</u>	<u>1912-24-9</u>	<u>ca, nc</u>	<u>2.5</u>	<u>25</u>		<u>78</u>
<u>Avermectin B1</u>	<u>71751-41-2</u>	<u>nc</u>			<u>24</u>	<u>250</u>
<u>Azobenzene</u>	<u>103-33-3</u>	<u>ca</u>	<u>5.0</u>	<u>50</u>		<u>160</u>
<u>Barium and compounds</u>	<u>7440-39-3</u>	<u>nc</u>			<u>15,000</u>	<u>170,000</u>
<u>Baygon</u>	<u>114-26-1</u>	<u>nc</u>			<u>240</u>	<u>2,500</u>
<u>Bayleton</u>	<u>43121-43-3</u>	<u>nc</u>			<u>1,800</u>	<u>18,000</u>
<u>Baythroid</u>	<u>68359-37-5</u>	<u>nc</u>			<u>1,500</u>	<u>15,000</u>
<u>Benefin</u>	<u>1861-40-1</u>	<u>nc</u>			<u>18,000</u>	<u>180,000</u>
<u>Benomyl</u>	<u>17804-35-2</u>	<u>nc</u>			<u>3,100</u>	<u>31,000</u>
<u>Bentazon</u>	<u>25057-89-0</u>	<u>nc</u>			<u>1,800</u>	<u>18,000</u>
<u>Benzaldehyde</u>	<u>100-52-7</u>	<u>nc</u>			<u>6,100</u>	<u>62,000</u>
<u>Benzene</u>	<u>71-43-2</u>	<u>ca, nc</u>	<u>0.65</u>	<u>NA</u>		<u>1.4</u>
<u>Benzidine</u>	<u>92-87-5</u>	<u>ca, nc</u>	<u>0.0024</u>	<u>NA</u>		<u>0.0075</u>
<u>Benzoic acid</u>	<u>65-85-0</u>	<u>nc</u>			<u>240,000</u>	<u>1,000,000 **</u>
<u>Benzotrichloride</u>	<u>98-07-7</u>	<u>ca</u>	<u>0.042</u>	<u>0.42</u>		<u>1.3</u>
<u>Benzyl alcohol</u>	<u>100-51-6</u>	<u>nc</u>			<u>18,000</u>	<u>180,000</u>
<u>Benzyl chloride</u>	<u>100-44-7</u>	<u>ca, nc</u>	<u>0.92</u>	<u>9.2</u>		<u>22</u>

CONTAMINANT	CASRN	Class	Residential (mg/kg)			Non-residential (mg/kg)
			Carcinogen		Non-carcinogen	
			10 ⁻⁶ Risk	10 ⁻⁵ Risk		
Beryllium and compounds	7440-41-7	ca, nc			150	1,900
Bidrin	141-66-2	nc			6.1	62
Biphenthrin (Talstar)	82657-04-3	nc			920	9,200
1,1-Biphenyl	92-52-4	nc			350 *	350 *
Bis(2-chloroethyl)ether	111-44-4	ca	0.23	2.3		5.8
Bis(2-chloroisopropyl)ether	39638-32-9	nc			790 *	790 *
Bis(chloromethyl)ether	542-88-1	ca	0.00020	NA		0.00043
Bis(2-chloro-1-methylethyl)ether	108-60-1	ca, nc	3.0	30		74
Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7	ca, nc	39	390		1200
Bisphenol A	80-05-7	nc			3,100	31,000
Boron	7440-42-8	nc			16,000	200,000
Bromate	15541-45-4	ca, nc	0.78	7.8		25
Bromobenzene	108-86-1	nc			28	92
Bromodichloromethane	75-27-4	ca, nc	0.83	8.3		18
Bromoform (tribromomethane)	75-25-2	ca, nc	69	690		2,200
Bromomethane (methyl bromide)	74-83-9	nc			3.9	13
Bromophos	2104-96-3	nc			310	3,100
Bromoxynil	1689-84-5	nc			1,200	12,000
Bromoxynil octanoate	1689-99-2	nc			1,200	12,000
1,3-Butadiene	106-99-0	ca, nc	0.058	0.58		1.2
1-Butanol	71-36-3	nc			6,100	61,000
Butylate	2008-41-5	nc			3,100	31,000
n-Butylbenzene	104-51-8	nc			240 *	240 *
sec-Butylbenzene	135-98-8	nc			220 *	220 *
tert-Butylbenzene	98-06-6	nc			390 *	390 *
Butyl benzyl phthalate	85-68-7	nc			12,000	120,000
Butylphthalyl butylglycolate	85-70-1	nc			61,000	620,000
Cadmium and compounds	7440-43-9	ca, nc			39	510
Caprolactam	105-60-2	nc			31,000	310,000
Captafol	2425-06-1	ca, nc	64	640	120	1,200
Captan	133-06-2	ca, nc	160	1,600		4,900
Carbaryl	63-25-2	nc			6,100	62,000
Carbazole	86-74-8	ca	27	270		860
Carbofuran	1563-66-2	nc			310	3,100
Carbon disulfide	75-15-0	nc			360	720 *
Carbon tetrachloride	56-23-5	ca, nc	0.25	2.5	2.2	5.5
Carbosulfan	55285-14-8	nc			610	6,200

CONTAMINANT	CASRN	Class	Residential (mg/kg)			Non-residential (mg/kg)
			Carcinogen		Non-carcinogen	
			10 ⁻⁶ Risk	10 ⁻⁵ Risk		
Carboxin	5234-68-4	nc			6,100	62,000
Chloral hydrate	302-17-0	nc			6,100	62,000
Chloramben	133-90-4	nc			920	9,200
Chloranil	118-75-2	ca	1.4	14		43
Chlordane	12789-03-6	ca, nc	1.9	19		65
Chlorimuron-ethyl	90982-32-4	nc			1,200	12,000
Chloroacetic acid	79-11-8	nc			120	1,200
2-Chloroacetophenone	532-27-4	nc			0.033	0.11
4-Chloroaniline	106-47-8	nc			240	2,500
Chlorobenzene	108-90-7	nc			150	530
Chlorobenzilate	510-15-6	ca, nc	2.0	20		64
p-Chlorobenzoic acid	74-11-3	nc			12,000	120,000
4-Chlorobenzotrifluoride	98-56-6	nc			1,200	12,000
2-Chloro-1,3-butadiene	126-99-8	nc			3.6	12
1-Chlorobutane	109-69-3	nc			480 *	480 *
1-Chloro-1,1-difluoroethane	75-68-3	nc			340 *	340 *
Chlorodifluoromethane	75-45-6	nc			340 *	340 *
Chloroethane	75-00-3	ca, nc	3.0	30		65
Chloroform	67-66-3	ca, nc	0.94	9.4		20
Chloromethane	74-87-3	nc			48	160
4-Chloro-2-methylaniline	95-69-2	ca	0.94	9.4		30
4-Chloro-2-methylaniline hydrochloride	3165-93-3	ca	1.2	12		37
beta-Chloronaphthalene	91-58-7	nc			110 *	110 *
o-Chloronitrobenzene	88-73-3	ca, nc			1.4	4.5
p-Chloronitrobenzene	100-00-5	ca, nc			10	37
2-Chlorophenol	95-57-8	nc			63	240
2-Chloropropane	75-29-6	nc			170	590
Chlorothalonil	1897-45-6	ca, nc	50	500		1600
o-Chlorotoluene	95-49-8	nc			160	510 *
Chlorpropham	101-21-3	nc			12,000	120,000
Chlorpyrifos	2921-88-2	nc			180	1,800
Chlorpyrifos-methyl	5598-13-0	nc			610	6,200
Chlorsulfuron	64902-72-3	nc			3,100	31,000
Chlorthiophos	60238-56-4	nc			49	490
Chromium III	16065-83-1	nc			120,000	1,000,000 **
Chromium VI	18540-29-9	ca, nc	30	NA		65
Cobalt	7440-48-4	ca, nc	900	9,000	1,400	13,000

CONTAMINANT	CASRN	Class	Residential (mg/kg)			Non-residential (mg/kg)
			Carcinogen		Non-carcinogen	
			10 ⁻⁶ Risk	10 ⁻⁵ Risk		
Copper and compounds	7440-50-8	nc			3,100	41,000
Crotonaldehyde	123-73-9	ca	0.0053	0.053		0.11
Cumene (isopropylbenzene)	98-82-8	nc			92 *	92 *
Cyanazine	21725-46-2	ca, nc	0.65	6.5		21
Cyanide (free)	57-12-5	nc			1,200	12,000
Cyanide (hydrogen)	74-90-8	nc			11	35
Cyanogen	460-19-5	nc			130	430
Cyanogen bromide	506-68-3	nc			290	970
Cyanogen chloride	506-77-4	nc			160	540
Cyclohexane	110-82-7	nc			140 *	140 *
Cyclohexanone	108-94-1	nc			310,000	1,000,000 **
Cyclohexylamine	108-91-8	nc			12,000	120,000
Cyhalothrin/Karate	68085-85-8	nc			310	3,100
Cypermethrin	52315-07-8	nc			610	6,200
Cyromazine	66215-27-8	nc			460	4,600
Dacthal	1861-32-1	nc			610	6,200
Dalapon	75-99-0	nc			1,800	18,000
Danitol	39515-41-8	nc			1,500	15,000
DDD	72-54-8	ca	2.8	28		100
DDE	72-55-9	ca	2.0	20		70
DDT	50-29-3	ca, nc	2.0	20		70
Decabromodiphenyl ether	1163-19-5	nc			610	6,200
Demeton	8065-48-3	nc			2.4	25
Diallate	2303-16-4	ca	9.0	90		280
Diazinon	333-41-5	nc			55	550
Dibenzofuran	132-64-9	nc			140 *	140 *
1,4-Dibromobenzene	106-37-6	nc			610	6,200
Dibromochloromethane	124-48-1	ca, nc	1.1	11		26
1,2-Dibromo-3-chloropropane	96-12-8	ca, nc	0.53	5.3	1.5	6.5
1,2-Dibromoethane	106-93-4	ca, nc	0.029	0.29		0.63
Dibutyl phthalate	84-74-2	nc			6,100	62,000
Dicamba	1918-00-9	nc			1,800	18,000
1,2-Dichlorobenzene	95-50-1	nc			600 *	600 *
1,3-Dichlorobenzene	541-73-1	nc			530	600 *
1,4-Dichlorobenzene	106-46-7	ca, nc	3.5	35		79
3,3-Dichlorobenzidine	91-94-1	ca	1.2	12		38
4,4'-Dichlorobenzophenone	90-98-2	nc			1,800	18,000

CONTAMINANT	CASRN	Class	Residential (mg/kg)			Non-residential (mg/kg)
			Carcinogen		Non-carcinogen	
			10 ⁻⁶ Risk	10 ⁻⁵ Risk		
1,4-Dichloro-2-butene	764-41-0	ca	0.0080	0.080		0.18
Dichlorodifluoromethane	75-71-8	nc			94	310
1,1-Dichloroethane	75-34-3	nc			510	1,700 *
1,2-Dichloroethane (DCA)	107-06-2	ca, nc	0.28	2.8		6.0
1,1-Dichloroethylene (DCE)	75-35-4	nc			120	410
1,2-Dichloroethylene (cis)	156-59-2	nc			43	150
1,2-Dichloroethylene (trans)	156-60-5	nc			69	230
2,4-Dichlorophenol	120-83-2	nc			180	1,800
4-(2,4-Dichlorophenoxy)butyric acid	94-82-6	nc			490	4,900
2,4-Dichlorophenoxyacetic Acid (2,4-D)	94-75-7	nc			690	7,700
1,2-Dichloropropane	78-87-5	ca, nc	0.34	3.4		7.4
1,3-Dichloropropane	142-28-9	nc			100	360
1,3-Dichloropropene	542-75-6	ca, nc	0.79	7.9		18
2,3-Dichloropropanol	616-23-9	nc			180	1,800
Dichlorvos	62-73-7	ca, nc	1.9	19		59
Dicofol	115-32-2	ca	1.2	12		39
Dicyclopentadiene	77-73-6	nc			0.54	1.8
Dieldrin	60-57-1	ca, nc	0.034	0.34		1.1
Diethylene glycol, monobutyl ether	112-34-5	nc			610	6,200
Diethylene glycol, monomethyl ether	111-90-0	nc			3,700	37,000
Diethylformamide	617-84-5	nc			24	250
Di(2-ethylhexyl)adipate	103-23-1	ca, nc	460	4,600		14,000
Diethyl phthalate	84-66-2	nc			49,000	490,000
Diethylstilbestrol	56-53-1	ca	0.00012	NA		0.0037
Difenzoquat (Avenge)	43222-48-6	nc			4,900	49,000
Diflubenzuron	35367-38-5	nc			1,200	12,000
Diisononyl phthalate	28553-12-0	nc			1,200	12,000
Diisopropyl methylphosphonate	1445-75-6	nc			4,900	49,000
Dimethipin	55290-64-7	nc			1,200	12,000
Dimethoate	60-51-5	nc			12	120
3,3'-Dimethoxybenzidine	119-90-4	ca	39	390		1,200
Dimethylamine	124-40-3	nc			0.067	0.25
N-N-Dimethylaniline	121-69-7	nc			120	1,200
2,4-Dimethylaniline	95-68-1	ca	0.73	7.3		23
2,4-Dimethylaniline hydrochloride	21436-96-4	ca	0.94	9.4		30
3,3'-Dimethylbenzidine	119-93-7	ca	0.24	2.4		7.5
N,N-Dimethylformamide	68-12-2	nc			6,100	62,000

CONTAMINANT	CASRN	Class	Residential (mg/kg)			Non-residential (mg/kg)
			Carcinogen		Non-carcinogen	
			10 ⁻⁶ Risk	10 ⁻⁵ Risk		
Dimethylphenethylamine	122-09-8	nc			61	620
2,4-Dimethylphenol	105-67-9	nc			1,200	12,000
2,6-Dimethylphenol	576-26-1	nc			37	370
3,4-Dimethylphenol	95-65-8	nc			61	620
Dimethyl phthalate	131-11-3	nc			610,000	1,000,000 **
Dimethyl terephthalate	120-61-6	nc			6,100	62,000
4,6-Dinitro-o-cyclohexyl phenol	131-89-5	nc			120	1,200
1,2-Dinitrobenzene	528-29-0	nc			6.1	62
1,3-Dinitrobenzene	99-65-0	nc			6.1	62
1,4-Dinitrobenzene	100-25-4	nc			6.1	62
2,4-Dinitrophenol	51-28-5	nc			120	1,200
Dinitrotoluene mixture	25321-14-6	ca	0.81	8.1		25
2,4-Dinitrotoluene	121-14-2	nc			120	1,200
2,6-Dinitrotoluene	606-20-2	nc			61	620
Dinoseb	88-85-7	nc			61	620
di-n-Octyl phthalate	117-84-0	nc			2,400	25,000
1,4-Dioxane	123-91-1	ca	50	500		1,600
Dioxin (2,3,7,8-TCDD)	1746-01-6	ca	0.0000045	0.000045		0.00016
Diphenamid	957-51-7	nc			1,800	18,000
Diphenylamine	122-39-4	nc			1,500	15,000
N,N-Diphenyl-1,4 benzenediamine (DPPD)	74-31-7	nc			18	180
1,2-Diphenylhydrazine	122-66-7	ca	0.68	6.8		22
Diphenyl sulfone	127-63-9	nc			180	1,800
Diquat	85-00-7	nc			130	1,400
Direct black 38	1937-37-7	ca	0.064	NA		0.20
Direct blue 6	2602-46-2	ca	0.068	NA		0.21
Direct brown 95	16071-86-6	ca	0.059	NA		0.19
Disulfoton	298-04-4	nc			2.4	25
1,4-Dithiane	505-29-3	nc			610	6,200
Diuron	330-54-1	nc			120	1,200
Dodine	2439-10-3	nc			240	2,500
Dysprosium	7429-91-6	nc			7,800	102,000
Endosulfan	115-29-7	nc			370	3,700
Endothall	145-73-3	nc			1,200	12,000
Endrin	72-20-8	nc			18	180
Epichlorohydrin	106-89-8	ca, nc			7.6	26

CONTAMINANT	CASRN	Class	Residential (mg/kg)			Non-residential (mg/kg)
			Carcinogen		Non-carcinogen	
			10 ⁻⁶ Risk	10 ⁻⁵ Risk		
1,2-Epoxybutane	106-88-7	nc			350	3,500
EPTC (S-Ethyl dipropylthiocarbamate)	759-94-4	nc			1,500	15,000
Ethephon (2-chloroethyl phosphonic acid)	16672-87-0	nc			310	3,100
Ethion	563-12-2	nc			31	310
2-Ethoxyethanol	110-80-5	nc			24,000	250,000
2-Ethoxyethanol acetate	111-15-9	nc			18,000	180,000
Ethyl acetate	141-78-6	nc			19,000	37,000 *
Ethyl acrylate	140-88-5	ca	0.21	2.1		4.5
Ethylbenzene	100-41-4	nc			400 *	400 *
Ethyl chloride	75-00-3	ca, nc	3.0	30		65
Ethylene cyanohydrin	109-78-4	nc			18,000	180,000
Ethylene diamine	107-15-3	nc			5,500	55,000
Ethylene glycol	107-21-1	nc			120,000	1,000,000 **
Ethylene glycol, monobutyl ether	111-76-2	nc			31,000	310,000
Ethylene oxide	75-21-8	ca	0.14	1.4		3.4
Ethylene thiourea (ETU)	96-45-7	ca, nc			4.9	49
Ethyl ether	60-29-7	nc			1,800 *	1,800 *
Ethyl methacrylate	97-63-2	nc			140 *	140 *
Ethyl p-nitrophenyl phenylphosphorothioate	2104-64-5	nc			0.61	6.2
Ethylphthalyl ethyl glycolate	84-72-0	nc			180,000	1,000,000 **
Express	101200-48-0	nc			490	4,900
Fenamiphos	22224-92-6	nc			15	150
Fluometuron	2164-17-2	nc			790	8,000
Fluoride	16984-48-8	nc			3,700	37,000
Fluoridone	59756-60-4	nc			4,900	49,000
Flurprimidol	56425-91-3	nc			1,200	12,000
Flutolanil	66332-96-5	nc			3,700	37,000
Fluvalinate	69409-94-5	nc			610	6,200
Folpet	133-07-3	ca, nc	160	1,600		4,900
Fomesafen	72178-02-0	ca	2.9	29		91
Fonofos	944-22-9	nc			120	1,200
Formaldehyde	50-00-0	ca, nc			9,200	92,000
Formic Acid	64-18-6	nc			110,000	1,000,000 **
Fosetyl-al	39148-24-8	nc			180,000	1,000,000 **
Furan	110-00-9	nc			2.5	8.5
Furazolidone	67-45-8	ca	0.14	1.4		4.5

CONTAMINANT	CASRN	Class	Residential (mg/kg)			Non-residential (mg/kg)
			Carcinogen		Non-carcinogen	
			10 ⁻⁶ Risk	10 ⁻⁵ Risk		
Furfural	98-01-1	nc			180	1,800
Furium	531-82-8	ca	0.011	0.11		0.34
Furmecyclox	60568-05-0	ca	18	180		570
Glufosinate-ammonium	77182-82-2	nc			24	250
Glycidaldehyde	765-34-4	nc			24	250
Glyphosate	1071-83-6	nc			6,100	62,000
Haloxypop-methyl	69806-40-2	nc			3.1	31
Harmony	79277-27-3	nc			790	8,003
Heptachlor	76-44-8	ca, nc	0.12	1.2		3.8
Heptachlor epoxide	1024-57-3	ca, nc	0.060	0.60		1.9
Hexabromobenzene	87-82-1	nc			120	1,200
Hexachlorobenzene	118-74-1	ca, nc	0.34	3.4		11
Hexachlorobutadiene	87-68-3	ca, nc	7.0	70	18	180
HCH (alpha)	319-84-6	ca, nc	0.10	1.0		3.6
HCH (beta)	319-85-7	ca, nc	0.36	3.6		13
HCH (gamma) Lindane	58-89-9	ca, nc	0.50	5.0		17
HCH-technical	608-73-1	ca	0.36	3.6		13
Hexachlorocyclopentadiene	77-47-4	nc			370	3,700
Hexachloroethane	67-72-1	ca, nc	39	390	61	620
Hexachlorophene	70-30-4	nc			18	180
Hexahydro-1,3,5-trinitro-1,3,5-triazine	121-82-4	ca, nc	5.0	50		160
1,6-Hexamethylene diisocyanate	822-06-0	nc			0.17	1.8
n-Hexane	110-54-3	nc			110 *	110 *
Hexazinone	51235-04-2	nc			2,020	20,000
Hydrazine, hydrazine sulfate	302-01-2	ca	0.18	1.8		5.7
Hydrazine, monomethyl	60-34-4	ca	0.18	1.8		5.7
Hydrazine, dimethyl	57-14-7	ca	0.18	1.8		5.7
p-Hydroquinone	123-31-9	ca, nc	9.8	98		310
Imazalil	35554-44-0	nc			790	8,000
Imazaquin	81335-37-7	nc			15,000	150,000
Iprodione	36734-19-7	nc			2,400	25,000
Isobutanol	78-83-1	nc			13,000	40,000 *
Isophorone	78-59-1	ca, nc	580	5,800		18,000
Isopropalin	33820-53-0	nc			920	9,200
Isopropyl methyl phosphonic acid	1832-54-8	nc			6,100	62,000
Isoxaben	82558-50-7	nc			3,100	31,000
Kepone	143-50-0	ca, nc	0.068	0.68		2.2

CONTAMINANT	CASRN	Class	Residential (mg/kg)		Non-residential (mg/kg)	
			Carcinogen			Non-carcinogen
			10 ⁻⁶ Risk	10 ⁻⁵ Risk		
Lactofen	77501-63-4	nc			120	1,200
Lead	7439-92-1	ca, nc			400	800
Lead (tetraethyl)	78-00-2	nc			0.0061	0.062
Linuron	330-55-2	nc			120	1,200
Lithium	7439-93-2	nc			1,600	20,000
Londax	83055-99-6	nc			12,000	120,000
Malathion	121-75-5	nc			1,200	12,000
Maleic anhydride	108-31-6	nc			6,100	62,000
Maleic hydrazide	123-33-1	nc			1,700	2,400 *
Malononitrile	109-77-3	nc			6.1	62
Mancozeb	8018-01-7	nc			1,800	18,000
Maneb	12427-38-2	ca, nc	9.1	91		290
Manganese	7439-96-5	nc			3,300	32,000
Mephosfolan	950-10-7	nc			5.5	55
Mepiquat	24307-26-4	nc			1,800	18,000
2-Mercaptobenzothiazole	149-30-4	ca, nc	19	190		590
Mercury and compounds	7487-94-7	nc			23	310
Mercury (methyl)	22967-92-6	nc			6.1	62
Merphos	150-50-5	nc			1.8	18
Merphos oxide	78-48-8	nc			1.8	18
Metalaxyl	57837-19-1	nc			3,700	37,000
Methacrylonitrile	126-98-7	nc			2.1	8.4
Methamidophos	10265-92-6	nc			3.1	31
Methanol	67-56-1	nc			31,000	310,000
Methidathion	950-37-8	nc			61	620
Methomyl	16752-77-5	nc			44	150
Methoxychlor	72-43-5	nc			310	3,100
2-Methoxyethanol	109-86-4	nc			61	620
2-Methoxyethanol acetate	110-49-6	nc			120	1,200
2-Methoxy-5-nitroaniline	99-59-2	ca	12	120		370
Methyl acetate	79-20-9	nc			22,000	92,000
Methyl acrylate	96-33-3	nc			70	230
2-Methylaniline (o-toluidine)	95-53-4	ca	2.3	23		72
2-Methylaniline hydrochloride	636-21-5	ca	3.0	30		96
2-Methyl-4-chlorophenoxyacetic acid	94-74-6	nc			31	310
4-(2-Methyl-4-chlorophenoxy) butyric acid (MCPB)	94-81-5	nc			610	6,200

CONTAMINANT	CASRN	Class	Residential (mg/kg)		Non-residential (mg/kg)	
			Carcinogen			
			10 ⁻⁶ Risk	10 ⁻⁵ Risk		
2-(2-Methyl-4-chlorophenoxy) propionic acid	93-65-2	nc			61	620
2-(2-Methyl-1,4-chlorophenoxy) propionic acid (MCPPI)	16484-77-8	nc			61	620
Methylcyclohexane	108-87-2	nc			230 *	230 *
4,4'-Methylenebisbenzeneamine	101-77-9	ca	2.2	22		69
4,4'-Methylene bis(2-chloroaniline)	101-14-4	ca, nc	4.2	42		130
4,4'-Methylene bis(N,N'-dimethyl) aniline	101-61-1	ca	12	120		370
Methylene bromide	74-95-3	nc			67	230
Methylene chloride	75-09-2	ca, nc	9.3	93		210
4,4'-Methylenediphenyl isocyanate	101-68-8	nc			10	110
Methyl ethyl ketone (MEK)	78-93-3	nc			23,000	34,000 *
Methyl isobutyl ketone (MIBK)	108-10-1	nc			5,300	17,000 *
Methyl mercaptan	74-93-1	nc			35	350
Methyl methacrylate	80-62-6	nc			2,200	2,700 *
2-Methyl-5-nitroaniline	99-55-8	ca	17	170		520
Methyl parathion	298-00-0	nc			15	150
2-Methylphenol	95-48-7	nc			3,100	31,000
3-Methylphenol	108-39-4	nc			3,100	31,000
4-Methylphenol	106-44-5	nc			310	3,100
Methyl phosphonic acid	993-13-5	nc			1,200	12,000
Methyl styrene (mixture)	25013-15-4	nc			130	540
Methyl styrene (alpha)	98-83-9	nc			680 *	680 *
Methyl tertbutyl ether (MTBE)	1634-04-4	ca, nc	32	320		710
Metolacior (Dual)	51218-45-2	nc			9,200	92,000
Metribuzin	21087-64-9	nc			1,500	15,000
Mirex	2385-85-5	ca, nc	0.30	3.0		9.6
Molinate	2212-67-1	nc			120	1,200
Molybdenum	7439-98-7	nc			390	5,100
Monochloramine	10599-90-3	nc			6,100	62,000
Naled	300-76-5	nc			120	1,200
Napropamide	15299-99-7	nc			6,100	62,000
Nickel and compounds	7440-02-0	nc			1,600	20,000
Nickel subsulfide	12035-72-2	ca	5,200	NA		11,000
2-Nitroaniline	88-74-4	nc			180	1,800
3-Nitroaniline	99-09-2	ca, nc			18	180
4-Nitroaniline	100-01-6	ca, nc	26	260	180	820
Nitrobenzene	98-95-3	nc			20	100

CONTAMINANT	CASRN	Class	Residential (mg/kg)			Non-residential (mg/kg)
			Carcinogen		Non-carcinogen	
			10 ⁻⁶ Risk	10 ⁻⁵ Risk		
Nitrofurantoin	67-20-9	nc			4,300	43,000
Nitrofurazone	59-87-0	ca	0.37	3.7		11
Nitroglycerin	55-63-0	ca	39	390		1,200
Nitroguanidine	556-88-7	nc			6,100	62,000
2-Nitropropane	79-46-9	ca, nc	0.0028	0.028		0.061
N-Nitrosodi-n-butylamine	924-16-3	ca	0.025	0.25		0.58
N-Nitrosodiethanolamine	1116-54-7	ca	0.20	2.0		6.2
N-Nitrosodiethylamine	55-18-5	ca	0.0037	0.037		0.11
N-Nitrosodimethylamine	62-75-9	ca, nc	0.011	0.11		0.34
N-Nitrosodiphenylamine	86-30-6	ca, nc	110	1,100		3,500
N-Nitroso di-n-propylamine	621-64-7	ca	0.078	0.78		2.5
N-Nitroso-N-methylethylamine	10595-95-6	ca	0.025	0.25		0.78
N-Nitrosopyrrolidine	930-55-2	ca	0.26	2.6		8.2
m-Nitrotoluene	99-08-1	nc			730	1,000 *
o-Nitrotoluene	88-72-2	ca, nc	0.93	9.3		22
p-Nitrotoluene	99-99-0	ca, nc	13	130		300
Norflurazon	27314-13-2	nc			2,400	25,000
NuStar	85509-19-9	nc			43	430
Octabromodiphenyl ether	32536-52-0	nc			180	1,800
Octahydro-1357-tetranitro-1357-tetrazocine (HMX)	2691-41-0	nc			3,100	31,000
Octamethylpyrophosphoramide	152-16-9	nc			120	1,200
Oryzalin	19044-88-3	nc			3,100	31,000
Oxadiazon	19666-30-9	nc			310	3,100
Oxamyl	23135-22-0	nc			1,500	15,000
Oxyfluorfen	42874-03-3	nc			180	1,800
Paclobutrazol	76738-62-0	nc			790	8,000
Paraquat	4685-14-7	nc			270	2,800
Parathion	56-38-2	nc			370	3,700
Pebulate	1114-71-2	nc			3,100	31,000
Pendimethalin	40487-42-1	nc			2,400	25,000
Pentabromo-6-chloro cyclohexane	87-84-3	ca	24	240		750
Pentabromodiphenyl ether	32534-81-9	nc			120	1,200
Pentachlorobenzene	608-93-5	nc			49	490
Pentachloronitrobenzene	82-68-8	ca, nc	2.1	21		66
Pentachlorophenol	87-86-5	ca, nc	3.2	32		90
Perchlorate	7601-90-3	nc			55	720

CONTAMINANT	CASRN	Class	Residential (mg/kg)			Non-residential (mg/kg)
			Carcinogen		Non-carcinogen	
			10 ⁻⁶ Risk	10 ⁻⁵ Risk		
Permethrin	52645-53-1	nc			3,100	31,000
Phenmedipham	13684-63-4	nc			15,000	150,000
Phenol	108-95-2	nc			18,000	180,000
Phenothiazine	92-84-2	nc			120	1,200
m-Phenylenediamine	108-45-2	nc			370	3,700
o-Phenylenediamine	95-54-5	ca	12	120		370
p-Phenylenediamine	106-50-3	nc			12,000	120,000
Phenylmercuric acetate	62-38-4	nc			4.9	49
2-Phenylphenol	90-43-7	ca	280	2,800		8,900
Phorate	298-02-2	nc			12	120
Phosmet	732-11-6	nc			1,200	12,000
Phosphine	7803-51-2	nc			18	180
Phosphorus (white)	7723-14-0	nc			1.6	20
p-Phthalic acid	100-21-0	nc			61,000	620,000
Phthalic anhydride	85-44-9	nc			120,000	1,000,000 **
Picloram	1918-02-1	nc			4,300	43,000
Pirimiphos-methyl	29232-93-7	nc			610	6,200
Polybrominated biphenyls (PBBs)	NA	ca, nc	0.062	0.62	0.43	1.9
Polychlorinated biphenyls (PCBs), low-risk mixture	12674-11-2	ca, nc			3.9	37
Polychlorinated biphenyls (PCBs), high-risk mixture	11097-69-1	ca, nc	0.25	2.5	1.1	7.4
Polychlorinated terphenyls	61788-33-8	ca	0.12	1.2		3.8
Polynuclear aromatic hydrocarbons						
Acenaphthene	83-32-9	nc			3,700	29,000
Anthracene	120-12-7	nc			22,000	240,000
Benz[a]anthracene	56-55-3	ca	0.69	6.9		21
Benzo[b]fluoranthene	205-99-2	ca	0.69	6.9		21
Benzo[k]fluoranthene	207-08-9	ca	6.9	69		210
Benzo[a]pyrene	50-32-8	ca	0.069	0.69		2.1
Chrysene	218-01-9	ca	68	680		2,000
Dibenz[ah]anthracene	53-70-3	ca	0.069	0.69		2.1
Fluoranthene	206-44-0	nc			2,300	22,000
Fluorene	86-73-7	nc			2,700	26,000
Indeno[1,2,3-cd]pyrene	193-39-5	ca	0.69	6.9		21
Naphthalene	91-20-3	nc			56	190
Pyrene	129-00-0	nc			2,300	29,000
Prochloraz	67747-09-5	ca, nc	3.7	37		110

CONTAMINANT	CASRN	Class	Residential (mg/kg)			Non-residential (mg/kg)
			Carcinogen		Non-carcinogen	
			10 ⁻⁶ Risk	10 ⁻⁵ Risk		
Profluralin	26399-36-0	nc			370	3,700
Prometon	1610-18-0	nc			920	9,200
Prometryn	7287-19-6	nc			240	2,500
Pronamide	23950-58-5	nc			4,600	46,000
Propachlor	1918-16-7	nc			790	8,000
Propanil	709-98-8	nc			310	3,100
Propargite	2312-35-8	nc			1,200	12,000
Propargyl alcohol	107-19-7	nc			120	1,200
Propazine	139-40-2	nc			1,200	12,000
Propham	122-42-9	nc			1,200	12,000
Propiconazole	60207-90-1	nc			790	8,000
n-Propylbenzene	103-65-1	nc			240 *	240 *
Propylene glycol	57-55-6	nc			30,000	290,000
Propylene glycol, monoethyl ether	52125-53-8	nc			43,000	430,000
Propylene glycol, monomethyl ether	107-98-2	nc			43,000	430,000
Propylene oxide	75-56-9	ca, nc	2.2	22		66
Pursuit	81335-77-5	nc			15,000	150,000
Pydrin	51630-58-1	nc			1,500	15,000
Pyridine	110-86-1	nc			61	620
Quinalphos	13593-03-8	nc			31	310
Quinoline	91-22-5	ca	0.18	1.8		5.7
RDX (Cyclonite)	121-82-4	ca, nc	5.0	50		160
Resmethrin	10453-86-8	nc			1,800	18,000
Ronnel	299-84-3	nc			3,100	31,000
Rotenone	83-79-4	nc			240	2,500
Savey	78587-05-0	nc			1,500	15,000
Selenious Acid	7783-00-8	nc			310	3,100
Selenium	7782-49-2	nc			390	5,100
Selenourea	630-10-4	nc			310	3,100
Sethoxydim	74051-80-2	nc			5,500	55,000
Silver and compounds	7440-22-4	nc			390	5,100
Simazine	122-34-9	ca, nc	4.6	46		140
Sodium azide	26628-22-8	nc			310	4,100
Sodium diethyldithiocarbamate	148-18-5	ca, nc	2.0	20		64
Sodium fluoroacetate	62-74-8	nc			1.2	12
Sodium metavanadate	13718-26-8	nc			61	620
Strontium, stable	7440-24-6	nc			47,000	610,000

CONTAMINANT	CASRN	Class	Residential (mg/kg)			Non-residential (mg/kg)
			Carcinogen		Non-carcinogen	
			10 ⁻⁶ Risk	10 ⁻⁵ Risk		
Strychnine	57-24-9	nc			18	180
Styrene	100-42-5	nc			1,500 *	1,500 *
1,1'-Sulfonylbis-(4-chlorobenzene)	80-07-9	nc			310	3,100
Systhane	88671-89-0	nc			1,500	15,000
Tebuthiuron	34014-18-1	nc			4,300	43,000
Temephos	3383-96-8	nc			1,200	12,000
Terbacil	5902-51-2	nc			790	8,000
Terbufos	13071-79-9	nc			1.5	15
Terbutryn	886-50-0	nc			61	620
1,2,4,5-Tetrachlorobenzene	95-94-3	nc			18	180
1,1,1,2-Tetrachloroethane	630-20-6	ca, nc	3.2	32		73
1,1,2,2-Tetrachloroethane	79-34-5	ca, nc	0.42	4.2		9.3
Tetrachloroethylene (PCE)	127-18-4	ca, nc	0.51	5.1		13
2,3,4,6-Tetrachlorophenol	58-90-2	nc			1,800	18,000
p.a.a.a-Tetrachlorotoluene	5216-25-1	ca	0.027	0.27		0.86
Tetrachlorovinphos	961-11-5	ca, nc	23	230		720
Tetraethyldithiopyrophosphate	3689-24-5	nc			31	310
Tetrahydrofuran	109-99-9	ca, nc	9.5	95		210
Thallium and compounds	7440-28-0	nc			5.2	67
Thiobencarb	28249-77-6	nc			610	6,200
Thiocyanate	NA	nc			3,100	31,000
Thiofanox	39196-18-4	nc			18	180
Thiophanate-methyl	23564-05-8	nc			4,900	49,000
Thiram	137-26-8	nc			310	3,100
Tin	7440-31-5	nc			47,000	610,000
Titanium	7440-32-6	nc			310,000	1,000,000 **
Toluene	108-88-3	nc			650 *	650 *
Toluene-2,4-diamine	95-80-7	ca	0.17	1.7		5.4
Toluene-2,5-diamine	95-70-5	nc			37,000	370,000
Toluene-2,6-diamine	823-40-5	nc			12,000	120,000
p-Toluidine	106-49-0	ca	2.9	29		91
Toxaphene	8001-35-2	ca	0.50	5.0		16
Tralomethrin	66841-25-6	nc			460	4,600
Triallate	2303-17-5	nc			790	8,000
Triasulfuron	82097-50-5	nc			610	6,200
1,2,4-Tribromobenzene	615-54-3	nc			310	3,100
Tributyl phosphate	126-73-8	ca, nc	60	600		1,900

CONTAMINANT	CASRN	Class	Residential (mg/kg)			Non-residential (mg/kg)
			Carcinogen		Non-carcinogen	
			10 ⁻⁶ Risk	10 ⁻⁵ Risk		
Tributyltin oxide (TBTO)	56-35-9	nc			18	180
2,4,6-Trichloroaniline	634-93-5	ca	16	160		510
2,4,6-Trichloroaniline hydrochloride	33663-50-2	ca	19	190		590
1,2,4-Trichlorobenzene	120-82-1	nc			62	220
1,1,1-Trichloroethane	71-55-6	nc			1,200 *	1,200 *
1,1,2-Trichloroethane	79-00-5	ca, nc	0.74	7.4		16
Trichloroethylene (TCE)	79-01-6	ca, nc	3.0	30	17	65
Trichlorofluoromethane	75-69-4	nc			390	1,300
2,4,5-Trichlorophenol	95-95-4	nc			6,100	62,000
2,4,6-Trichlorophenol	88-06-2	ca, nc			6.1	62
2,4,5-Trichlorophenoxyacetic Acid	93-76-5	nc			610	6,200
2-(2,4,5-Trichlorophenoxy) propionic acid	93-72-1	nc			490	4,900
1,1,2-Trichloropropane	598-77-6	nc			15	51
1,2,3-Trichloropropane	96-18-4	ca, nc	0.0050	0.050		0.11
1,2,3-Trichloropropene	96-19-5	nc			0.71	2.3
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	76-13-1	nc			5,600 *	5,600 *
Tridiphan	58138-08-2	nc			180	1,800
Triethylamine	121-44-8	nc			23	86
Trifluralin	1582-09-8	ca, nc	71	710	460	2,200
Trimellitic Anhydride (TMAN)	552-30-7	nc			8.6	86
1,2,4-Trimethylbenzene	95-63-6	nc			52	170
1,3,5-Trimethylbenzene	108-67-8	nc			21	70
Trimethyl phosphate	512-56-1	ca	15	150		470
1,3,5-Trinitrobenzene	99-35-4	nc			1,800	18,000
Trinitrophenylmethylnitramine	479-45-8	nc			610	6,200
2,4,6-Trinitrotoluene	118-96-7	ca, nc	18	180	31	310
Triphenylphosphine oxide	791-28-6	nc			1,200	12,000
Tris(2-chloroethyl) phosphate	115-96-8	ca, nc	39	390		1,200
Tris(2-ethylhexyl) phosphate	78-42-2	ca, nc	170	1,700		5,400
Uranium (chemical toxicity only)	7440-61-0	nc			16	200
Vanadium and compounds	7440-62-2	nc			78	1,000
Vernam	1929-77-7	nc			61	620
Vinclozolin	50471-44-8	nc			1,500	15,000
Vinyl acetate	108-05-4	nc			430	1,400
Vinyl bromide	593-60-2	ca, nc	0.19	1.9		4.2
Vinyl chloride	75-01-4	ca, nc	0.085	NA		0.75

<u>CONTAMINANT</u>	<u>CASRN</u>	<u>Class</u>	<u>Residential (mg/kg)</u>		<u>Non- residential (mg/kg)</u>	
			<u>Carcinogen</u>			<u>Non- carcinogen</u>
			<u>10⁻⁶ Risk</u>	<u>10⁻⁵ Risk</u>		
<u>Warfarin</u>	<u>81-81-2</u>	<u>nc</u>			<u>18</u>	<u>180</u>
<u>Xylenes</u>	<u>1330-20-7</u>	<u>nc</u>			<u>270</u>	<u>420 *</u>
<u>Zinc</u>	<u>7440-66-6</u>	<u>nc</u>			<u>23,000</u>	<u>310,000</u>
<u>Zinc phosphide</u>	<u>1314-84-7</u>	<u>nc</u>			<u>23</u>	<u>310</u>
<u>Zineb</u>	<u>12122-67-7</u>	<u>nc</u>			<u>3,100</u>	<u>31,000</u>
<u>NA indicates not applicable.</u>						
<u>Class is the classification of the chemical. “ca” indicates carcinogen; “nc” indicates non-carcinogen. Chemicals may be either or both, as indicated.</u>						
<u>* Indicates SRL is based on the chemical-specific saturation level in soil for volatile organic chemicals only.</u>						
<u>** Indicates SRL is based on a 100% saturation ceiling limit for non-volatile organic chemicals.</u>						
<u>Bold indicates adequate evidence to classify the chemical as a known human carcinogen.</u>						
CASRN is the Chemical Abstract System Registry Number.						

Appendix A B. 1997 Soil Remediation Levels (SRLs)

	Chemical Name	Cas-CAS Number	Cancer Group	Residential (mg/kg)	Non-residential (mg/kg)
A					
1	Acenaphthene	83-32-9	D	3900.0	41000.0
2	Acephate	30560-19-1	C	260.0	2200.0
3	Acetaldehyde	75-07-0	B2	39.0	150.0
4	Acetochlor	34256-82-1	D	1300.0	14000.0
5	Acetone	67-64-1	D	2100.0	8800.0
6	Acetone cyanohydrin	75-86-5	D	52.0	550.0
7	Acetonitrile	75-05-8	D	220.0	1200.0
8	Acetophenone	98-86-2	D	0.49	1.6
9	Acifluorfen	62476-59-9	D	850.0	8900.0
10	Acrolein	107-02-8	C	0.10	0.34
11	Acrylamide	79-06-1	B2	0.98	4.2
12	Acrylic acid	79-10-7	D	31000.0	290000.0
13	Acrylonitrile	107-13-1	B1	1.9	4.7
14	Alachlor	15972-60-8	B2	55.0	240.0
15	Alar	1596-84-5	D	9800.0	100000.0
16	Aldicarb	116-06-3	D	65.0	680.0
17	Aldicarb sulfone	1646-88-4	D	65.0	680.0
18	Aldrin	309-00-2	B2	0.26	1.1
		5585-64-8			
19	Ally	<u>74223-64-6</u>	D	16000.0	170000.0
20	Allyl alcohol	107-18-6	D	330.0	3400.0
21	Allyl chloride	107-05-1	C	3200.0	33000.0

	Chemical Name	Cas-CAS Number	Cancer Group	Residential (mg/kg)	Non-residential (mg/kg)
22	Aluminum	7429-90-5	D	77000.0	1000000.0
23	Aluminum phosphide	20859-73-8	D	31.0	680.0
24	Amdro	67485-29-4	D	20.0	200.0
25	Ametryn	834-12-8	D	590.0	6100.0
26	m-Aminophenol	591-27-5	D	4600.0	48000.0
27	4-Aminopyridine	504-24-5	D	1.3	14.0
28	Amitraz	33089-61-1	D	160.0	1700.0
29	Ammonia	7664-41-7	D	2200.0	58000.0
30	Ammonium sulfamate	7773-06-0	D	13000.0	140000.0
31	Aniline	62-53-3	B2	19.0	200.0
32	Anthracene	120-12-7	D	20000.0	200000.0
33	Antimony and compounds	7440-36-0	D	31.0	680.0
34	Antimony pentoxide	1314-60-9	D	38.0	850.0
35	Antimony potassium tartrate	28300-74-5	D	69.0	1500.0
36	Antimony tetroxide	1332-81-6	D	31.0	680.0
37	Antimony trioxide	1309-64-4	D	31.0	680.0
38	Apollo	74115-24-5	C	850.0	8900.0
39	Aramite	140-57-8	B2	180.0	760.0
40	~Arsenic	7440-38-2 76578-12-6	A	10.0	10.0
41	Assure	76578-14-8	D	590.0	6100.0
42	Asulam	3337-71-1	D	3300.0	34000.0
43	Atrazine	1912-24-9 65195-55-3	C	20.0	86.0
44	Avermectin B1	71751-41-2	D	26.0	270.0
45	Azobenzene	103-33-3	B2	40.0	170.0
B					
46	Barium and compounds	7440-39-3	D	5300.0	110000.0
47	Barium cyanide	542-62-1	D	7700.0	170000.0
48	Baygon	114-26-1	D	260.0	2700.0
49	Bayleton	43121-43-3	D	2000.0	20000.0
50	Baythroid	68359-37-5	D	1600.0	17000.0
51	Benefin	1861-40-1	D	20000.0	200000.0
52	Benomyl	17804-35-2	D	3300.0	34000.0
53	Bentazon	25057-89-0	D	160.0	1700.0
54	Benzaldehyde	100-52-7	D	6500.0	68000.0
55	Benz[a]anthracene	56-55-3	B2	6.1	26.0
56	Benzene	71-43-2	A	0.62	1.4
57	Benzidine	92-87-5	A	0.0019	0.0083
58	Benzo[a]pyrene	50-32-8	B2	0.61	2.6
59	Benzo[b]fluoranthene	205-99-2	B2	6.1	26.0

	Chemical Name	Cas-CAS Number	Cancer Group	Residential (mg/kg)	Non-residential (mg/kg)
60	Benzoic acid	65-85-0	D	260000.0	1000000.0
61	Benzo[k]fluoranthene	207-08-9	B2	61.0	260.0
62	Benzotrichloride	98-07-7	B2	0.34	1.5
63	Benzyl alcohol	100-51-6	D	20000.0	200000.0
64	Benzyl chloride	100-44-7	B2	8.0	20.0
65	Beryllium and compounds	7440-41-7	B2	1.4	11.0
66	Bidrin	141-66-2	D	6.5	68.0
67	Biphenthrin (Talstar)	82657-04-3	D	980.0	10000.0
68	1,1-Biphenyl	92-52-4	D	3300.0	34000.0
69	Bis(2-chloroethyl)ether	111-44-4	B2	0.43	0.97
70	Bis(2-chloroisopropyl)ether	39638-32-9	C	25.0	67.0
71	Bis(chloromethyl)ether	542-88-1	A	0.0002	0.0004
72	Bis(2-chloro-1-methylethyl)ether	108-60-1	C	63.0	270.0
73	Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7	B2	320.0	1400.0
74	Bisphenol A	80-05-7	D	3300.0	34000.0
75	Boron	7440-42-8	D	5900.0	61000.0
76	Bromodichloromethane	75-27-4	B2	6.3	14.0
77	Bromoform (tribromomethane)	75-25-2	B2	560.0	2400.0
78	Bromomethane	74-83-9	D	6.8	23.0
79	Bromophos	2104-96-3	D	330.0	3400.0
80	Bromoxynil	1689-84-5	D	1300.0	14000.0
81	Bromoxynil octanoate	1689-99-2	D	1300.0	14000.0
82	1,3-Butadiene	106-99-0	B2	0.064	0.14
83	1-Butanol	71-36-3	D	6500.0	68000.0
84	Butylate	2008-41-5	D	3300.0	34000.0
85	Butyl benzyl phthalate	85-68-7	C	13000.00	140000.00
86	Butylphthalyl butylglycolate	85-70-1	D	65000.0	680000.0
C					
87	Cacodylic acid	75-60-5	D	200.0	2000.0
88	Cadmium and compounds	7440-43-9	B1	38.0	850.0
89	Calcium cyanide	592-01-8	D	3100.0	68000.0
90	Caprolactam	105-60-2	D	33000.0	340000.0
91	Captafol	2425-06-1	C	130.0	1400.0
92	Captan	133-06-2	D	1300.0	5500.0
93	Carbaryl	63-25-2	D	6500.0	68000.0
94	Carbazole	86-74-8	B2	220.0	950.0
95	Carbofuran	1563-66-2	E	330.0	3400.0
96	Carbon disulfide	75-15-0	D	7.5	24.0
97	Carbon tetrachloride	56-23-5	B2	1.6	5.0
98	Carbosulfan	55285-14-8	D	650.0	6800.0

	Chemical Name	Cas-CAS Number	Cancer Group	Residential (mg/kg)	Non-residential (mg/kg)
99	Carboxin	5234-68-4	D	6500.0	68000.0
100	Chloral (<u>hydrate</u>)	302-17-0	D	130.0	1400.0
101	Chloramben	133-90-4	D	980.0	10000.0
102	Chloranil	118-75-2 57-74-9	C	11.0	47.0
103	Chlordane	<u>12789-03-6</u>	B2	3.4	15.0
104	Chlorimuron-ethyl	90982-32-4	D	1300.0	14000.0
105	Chlorine cyanide	506-77-4	D	3800.0	85000.0
106	Chloroacetic acid	79-11-8	D	130.0	1400.0
107	2-Chloroacetophenone	532-27-4	D	0.56	5.9
108	4-Chloroaniline	106-47-8	D	260.0	2700.0
109	Chlorobenzene	108-90-7	D	65.0	220.0
110	Chlorobenzilate	510-15-6	B2	16.0	71.0
111	p-Chlorobenzoic acid	74-11-3	D	13000.0	140000.0
112	4-Chlorobenzotrifluoride	98-56-6	D	1300.0	14000.0
113	2-Chloro-1,3-butadiene	126-99-8	D	3.6	12.0
114	1-Chlorobutane	109-69-3	D	710.0	2400.0
115	* 1-Chloro-1,1-difluoroethane	75-68-3	D	2800.0	2800.0
116	* Chlorodifluoromethane	75-45-6	D	2800.0	2800.0
117	Chloroform	67-66-3	B2	2.5	5.3
118	Chloromethane	74-87-3	C	12.0	26.0
119	4-Chloro-2-methylaniline	95-69-2	B2	7.7	33.0
120	4-Chloro-2-methylaniline hydrochloride	3165-93-3	B2	9.7	41.0
121	beta-Chloronaphthalene	91-58-7	D	5200.0	55000.0
122	o-Chloronitrobenzene	88-73-3	B2	180.0	760.0
123	p-Chloronitrobenzene	100-00-5	B2	250.0	1100.0
124	2-Chlorophenol	95-57-8	D	91.0	370.0
125	2-Chloropropane	75-29-6	D	170.0	580.0
126	Chlorothalonil	1897-45-6	B2	400.0	1700.0
127	* o-Chlorotoluene	95-49-8	D	160.0	550.0
128	Chlorpropham	101-21-3	D	13000.0	140000.0
129	Chlorpyrifos	2921-88-2	D	200.0	2000.0
130	Chlorpyrifos-methyl	5598-13-0	D	650.0	6800.0
131	Chlorsulfuron	64902-72-3	D	3300.0	34000.0
132	Chlorthiophos	602-38-56-4	D	52.0	550.0
133	Chromium, Total (1/6 ratio Cr VI/Cr III)	N/A	D	2100.0	4500.0
134	Chromium III	16065-83-1	D	77000.0	1000000.0
135	Chromium VI	7440-47-3	A	30.0	64.0
136	Chrysene	218-01-9	B2	610.0	2600.0
137	Cobalt	7440-48-4	D	4600.0	97000.0

	Chemical Name	Cas-CAS Number	Cancer Group	Residential (mg/kg)	Non-residential (mg/kg)
138	Copper and compounds	7440-50-8	D	2800.0	63000.0
139	Copper cyanide	544-92-3	D	380.0	8500.0
140	Crotonaldehyde	123-73-9	C	0.052	0.11
141	Cumene	98-82-8	D	19.0	62.0
142	Cyanazine	21725-46-2	D	5.3	23.0
143	Cyanide, Free	57-12-5	D	1300.0	14000.0
144	Cyanogen	460-19-5	D	2600.0	27000.0
145	Cyanogen bromide	506-68-3	D	5900.0	61000.0
146	Cyanogen chloride	506-77-4	D	3300.0	34000.0
147	Cyclohexanone	108-94-1	D	330000.0	1000000.0
148	Cyclohexylamine	108-91-8	D	13000.0	140000.0
149	Cyhalothrin/Karate	68085-85-8	D	330.0	3400.0
150	Cypermethrin	52315-07-8	D	650.0	6800.0
151	Cyromazine	66215-27-8	D	490.0	5100.0
D					
152	Dacthal	1861-32-1	D	650.0	6800.0
153	Dalapon	75-99-0	D	2000.0	20000.0
154	Danitol	39515-41-8	D	1600.0	17000.0
155	DDD	72-54-8	B2	19.0	80.0
156	DDE	72-55-9	B2	13.0	56.0
157	DDT	50-29-3	B2	13.0	56.0
158	Decabromodiphenyl ether	1163-19-5	C	650.0	6800.0
159	Demeton	8065-48-3	D	2.6	27.0
160	Diallate	2303-16-4	B2	73.0	310.0
161	Diazinon	333-41-5	E	59.0	610.0
162	Dibenz[ah]anthracene	53-70-3	B2	0.61	2.6
163	Dibenzofuran	132-64-9	D	260.0	2700.0
164	1,4-Dibromobenzene	106-37-6	D	650.0	6800.0
165	Dibromochloromethane	124-48-1	C	53.0	230.0
166	1,2-Dibromo-3-chloropropane	96-12-8	B2	3.2	14.0
167	1,2-Dibromoethane	106-93-4	B2	0.049	0.2
168	Dibutyl phthalate	84-74-2	D	6500.0	68000.0
169	Dicamba	1918-00-9	D	2000.0	20000.0
170	* 1,2-Dichlorobenzene	95-50-1	D	1100.0	3900.0
171	* 1,3-Dichlorobenzene	541-73-1	D	500.0	2000.0
172	1,4-Dichlorobenzene	106-46-7	C	190.0	790.0
173	3,3-Dichlorobenzidine	91-94-1	B2	9.9	42.0
174	1,4-Dichloro-2-butene	764-41-0	B2	0.074	0.17
175	Dichlorodifluoromethane	75-71-8	D	94.0	310.0
176	1,1-Dichloroethane	75-34-3	C	500.0	1700.0

	Chemical Name	Cas-CAS Number	Cancer Group	Residential (mg/kg)	Non-residential (mg/kg)
177	1,2-Dichloroethane (<u>EDC</u>)	107-06-2	B2	2.5	5.5
178	1,1-Dichloroethylene	75-35-4	C	0.36	0.8
179	1,2-Dichloroethylene (cis)	156-59-2	D	31.0	100.0
180	1,2-Dichloroethylene (trans)	156-60-5	D	78.0	270.0
181	1,2-Dichloroethylene (mixture)	540-59-0	D	35.0	120.0
182	2,4-Dichlorophenol	120-83-2	D	200.0	2000.0
183	4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	94-82-6	D	520.0	5500.0
184	2,4-Dichlorophenoxyacetic Acid (2,4-D)	94-75-7	D	650.0	6800.0
185	1,2-Dichloropropane	78-87-5	B2	3.1	6.8
186	1,3-Dichloropropene	542-75-6	B2	2.4	5.5
187	2,3-Dichloropropanol	616-23-9	D	200.0	2000.0
188	Dichlorvos	62-73-7	B2	15.0	66.0
189	Dicofol	115-32-2	C	10.0	43.0
190	Dieldrin	60-57-1	B2	0.28	1.2
191	Diethylene glycol, monobutyl ether	112-34-5	D	370.0	3900.0
192	Diethylene glycol, monoethyl ether	111-90-0	D	130000.0	1000000.0
193	Diethylformamide	617-84-5	D	720.0	7500.0
194	Di(2-ethylhexyl)adipate	103-23-1	C	3700.0	16000.0
195	Diethyl phthalate	84-66-2	D	52000.0	550000.0
196	Diethylstilbestrol	56-53-1	A	0.0001	0.0004
197	Difenzoquat (Avenge)	43222-48-6	D	5200.0	55000.0
198	Diflubenzuron	35367-38-5	D	1300.0	14000.0
199	Diisopropyl methylphosphonate	1445-75-6	D	5200.0	55000.0
200	Dimethipin	55290-64-7	C	1300.0	14000.0
201	Dimethoate	60-51-5	D	13.0	140.0
202	3,3'-Dimethoxybenzidine	119-90-4	B2	320.0	1400.0
203	Dimethylamine	124-40-3	D	0.07	0.24
204	N-N-Dimethylaniline	121-69-7	D	130.0	1400.0
205	2,4-Dimethylaniline	95-68-1	C	5.9	25.0
206	2,4-Dimethylaniline hydrochloride	21436-96-4	C	7.7	33.0
207	3,3'-Dimethylbenzidine	119-93-7	B2	0.48	2.1
208	1,1-Dimethylhydrazine (<u>Hydrazine, dimethyl</u>)	57-14-7	B, C	1.7	7.3
209	1,2-Dimethylhydrazine	540-73-8	B2	0.12	0.52
210	N,N-Dimethylformamide	68-12-2	D	6500.0	68000.0
211	2,4-Dimethylphenol	105-67-9	D	1300.0	14000.0
212	2,6-Dimethylphenol	576-26-1	D	39.0	410.0
213	3,4-Dimethylphenol	95-65-8	D	65.0	680.0
214	Dimethyl phthalate	131-11-3	D	650000.0	1000000.0
215	Dimethyl terephthalate	120-61-6	D	6500.0	68000.0
216	4,6-Dinitro-o-cyclohexyl phenol	131-89-5	D	130.0	1400.0

	Chemical Name	Cas-CAS Number	Cancer Group	Residential (mg/kg)	Non-residential (mg/kg)
217	1,3-Dinitrobenzene	99-65-0	D	6.5	68.0
218	1,2-Dinitrobenzene	528-29-0	D	26.0	270.0
219	1,4-Dinitrobenzene	100-25-4	D	26.0	270.0
220	2,4-Dinitrophenol	51-28-5	D	130.0	1400.0
221	Dinitrotoluene mixture	25321-14-6	B2	6.5	28.0
222	2,4-Dinitrotoluene	121-14-2	B2 D	130.0	1400.0
223	2,6-Dinitrotoluene	606-20-2	D	65.0	680.0
224	Dinoseb	88-85-7	D	65.0	680.0
225	di-n-Octyl phthalate	117-84-0	D	1300.0	14000.0
226	1,4-Dioxane	123-91-1	B2	400.0	1700.0
227	Diphenamid	957-51-7	D	2000.0	20000.0
228	Diphenylamine	122-39-4	D	1600.0	17000.0
229	1,2-Diphenylhydrazine	122-66-7	B2	5.6	24.0
230	Diquat	85-00-7	D	140.0	1500.0
231	Direct black 38	1937-37-7	A	0.052	0.22
232	Direct blue 6	2602-46-2	A	0.055	0.24
233	Direct brown 95	16071-86-6	A	0.048	0.21
234	Disulfoton	298-04-4	E	2.6	27.0
235	1,4-Dithiane	505-29-3	D	650.0	6800.0
236	Diuron	330-54-1	D	130.0	1400.0
237	Dodine	2439-10-3	D	260.0	2700.0
E					
238	Endosulfan	115-29-7	D	390.0	4100.0
239	Endothall	145-73-3	D	1300.0	14000.0
240	Endrin	72-20-8	D	20.0	200.0
241	Epichlorohydrin	106-89-8	B2	7.5	25.0
242	1,2-Epoxybutane	106-88-7	D	370.0	3900.0
243	EPTC (S-Ethyl dipropylthiocarbamate)	759-94-4	D	1600.0	17000.0
244	Ethephon (2-chloroethyl phosphonic acid)	16672-87-0	D	330.0	3400.0
245	Ethion	563-12-2	D	33.0	340.0
246	2-Ethoxyethanol	110-80-5	D	26000.0	270000.0
247	2-Ethoxyethanol acetate	111-15-9	D	20000.0	200000.0
248	* Ethyl acetate	141-78-6	D	18000.0	39000.0
249	Ethyl acrylate	140-88-5	B2	2.1	4.5
250	* Ethylbenzene	100-41-4	D	1500.0	2700.0
251	Ethylene cyanohydrin	109-78-4	D	20000.0	200000.0
252	Ethylene diamine	107-15-3	D	1300.0	14000.0
253	Ethylene glycol	107-21-1	D	130000.0	1000000.0
254	Ethylene glycol, monobutyl ether	111-76-2	D	370.0	3900.0
255	Ethylene oxide	75-21-8	B1	1.3	3.2

	Chemical Name	Cas-CAS Number	Cancer Group	Residential (mg/kg)	Non-residential (mg/kg)
256	Ethylene thiourea (ETU)	96-45-7	B2	5.2	55.0
257	* Ethyl chloride	75-00-3	D	1100.0	4200.0
258	* Ethyl ether	60-29-7	D	3800.0	3800.0
259	* Ethyl methacrylate	97-63-2	D	210.0	690.0
260	Ethyl p-nitrophenyl phenylphosphorothioate	2104-64-5	D	0.65	6.8
261	Ethylphthalyl ethyl glycolate	84-72-0	D	200000.0	1000000.0
262	Express	101200-48-0	D	520.0	5500.0
	F				
263	Fenamiphos	22224-92-6	D	16.0	170.0
264	Fluometuron	2164-17-2	D	850.0	8900.0
265	Fluoranthene	206-44-0	D	2600.0	27000.0
266	Fluorene	86-73-7	D	2600.0	27000.0
267	Fluorine (soluble fluoride)	7782-41-4	D	3900.0	41000.0
268	Fluoridone	59756-60-4	D	5200.0	55000.0
269	Flurprimidol	56425-91-3	D	1300.0	14000.0
270	Flutolanil	66332-96-5	D	3900.0	41000.0
271	Fluvalinate	69409-94-5	D	650.0	6800.0
272	Folpet	133-07-3	B2	1300.0	5500.0
273	Fomesafen	72178-02-0	C	23.0	100.0
274	Fonofos	944-22-9	D	130.0	1400.0
275	Formaldehyde	50-00-0	B1	9800.0	100000.0
276	Formic Acid	64-18-6	D	130000.0	1000000.0
277	Fosetyl-al	39148-24-8	C	200000.0	1000000.0
278	Furan	110-00-9	D	2.5	8.5
279	Furazolidone	67-45-8	B2	1.2	5.0
280	Furfural	98-01-1	D	200.0	2000.0
281	Furium	531-82-8	B2	0.089	0.38
282	Furmecyclox	60568-05-0	B2	150.0	640.0
	G				
283	Glufosinate-ammonium	77182-82-2	D	26.0	270.0
284	Glycidaldehyde	765-34-4	B2	26.0	270.0
285	Glyphosate	1071-83-6	D	6500.0	68000.0
	H				
286	Haloxypop-methyl	69806-40-2	D	3.3	34.0
287	Harmony	79277-27-3	D	850.0	8900.0
288	Heptachlor	76-44-8	B2	0.99	4.2
289	Heptachlor epoxide	1024-57-3	B2	0.49	2.1
290	Hexabromobenzene	87-82-1	D	130.0	1400.0
291	Hexachlorobenzene	118-74-1	B2	2.8	12.0
292	Hexachlorobutadiene	87-68-3	C	13.0	140.0

	Chemical Name	Cas-CAS Number	Cancer Group	Residential (mg/kg)	Non-residential (mg/kg)
293	HCH (alpha)	319-84-6	B2	0.71	3.0
294	HCH (beta)	319-85-7	C	2.5	11.0
295	HCH (gamma) Lindane	58-89-9	B2-C	3.4	15.0
296	HCH-technical	608-73-1	B2	2.5	11.0
297	Hexachlorocyclopentadiene	77-47-4	D	450.0	4600.0
298	Hexachlorodibenzo-p-dioxin mixture (HxCDD)	19408-74-3	B2	0.00072	0.0031
299	Hexachloroethane	67-72-1	C	65.0	680.0
300	Hexachlorophene	70-30-4	D	20.0	200.0
301	Hexahydro-1,3,5-trinitro-1,3,5-triazine	121-82-4	C	40.0	170.0
302	* n-Hexane	110-54-3	D	120.0	400.0
303	Hexazinone	51235-04-2	D	2200.0	22000.0
304	Hydrazine, hydrazine sulfate	302-01-2	B2	1.5	6.4
305	Hydrocarbons (C ₁₀ to C ₃₂)	N/A	N/A	4100.0	18000.0
306	Hydrogen chloride	7647-01-0	D	370.0	3900.0
307	Hydrogen cyanide	74-90-8	D	11.0	35.0
308	p-Hydroquinone	123-31-9	D	2600.0	27000.0
	I				
309	Imazalil	35554-44-0	D	850.0	8900.0
310	Imazaquin	81335-37-7	D	16000.0	170000.0
311	Indeno[1,2,3-cd]pyrene	193-39-5	B2	6.1	26.0
312	Iprodione	36734-19-7	D	2600.0	27000.0
313	* Isobutanol	78-83-1	D	11000.0	42000.0
314	Isophorone	78-59-1	C	4700.0	20000.0
315	Isopropalin	33820-53-0	D	980.0	10000.0
316	Isopropyl methyl phosphonic acid	1832-54-8	D	6500.0	68000.0
317	Isoxaben	82558-50-7	C	3300.0	34000.0
	K				
318	Kepone	143-50-0	B, C	0.25	1.1
	L				
319	Lactofen	77501-63-4	D	130.0	1400.0
320	#Lead	7439-92-1	B2	400.0	2000.0
321	Lead (tetraethyl)	78-00-2	D	0.0065	0.068
322	Linuron	330-55-2	C	130.0	1400.0
323	Lithium	7439-93-2	D	1500.0	34000.0
324	Londax	83055-99-6	D	13000.0	140000.0
	M				
325	Malathion	121-75-5	D	1300.0	14000.0
326	Maleic anhydride	108-31-6	D	6500.0	68000.0
327	Maleic hydrazide	123-33-1	D	33000.0	340000.0
328	Malononitrile	109-77-3	D	1.3	14.0

	Chemical Name	Cas-CAS Number	Cancer Group	Residential (mg/kg)	Non-residential (mg/kg)
329	Mancozeb	8018-01-7	D	2000.0	20000.0
330	Maneb	12427-38-2	D	330.0	3400.0
331	Manganese and compounds	7439-96-5	D	3200.0	43000.0
332	Mephosfolan	950-10-7	D	5.9	61.0
333	Mepiquat	24307-26-4	D	2000.0	20000.0
334	Mercuric chloride	7487-94-7	C	23.0	510.0
335	Mercury (elemental)	7439-97-6	D	6.7	180.0
336	Mercury (methyl)	22967-92-6	D	6.5	68.0
337	Merphos	150-50-5	D	2.0	20.0
338	Merphos oxide	78-48-8	D	2.0	20.0
339	Metalaxyl	57837-19-1	D	3900.0	41000.0
340	Methacrylonitrile	126-98-7	D	2.0	8.1
341	Methamidophos	10265-92-6	D	3.3	34.0
342	Methanol	67-56-1	D	33000.0	340000.0
343	Methidathion	950-37-8	C	65.0	680.0
344	Methomyl	16752-77-5	D	1600.0	17000.0
345	Methoxychlor	72-43-5	D	330.0	3400.0
346	2-Methoxyethanol	109-86-4	D	65.0	680.0
347	2-Methoxyethanol acetate	110-49-6	D	130.0	1400.0
348	2-Methoxy-5-nitroaniline	99-59-2	C	97.0	410.0
349	Methyl acetate	79-20-9	D	21000.0	88000.0
350	Methyl acrylate	96-33-3	D	69.0	230.0
351	2-Methylaniline (o-toluidine)	100-61-8 <u>95-53-4</u>	B2	19.0	79.0
352	2-Methylaniline hydrochloride	636-21-5	B2	25.0	110.0
353	Methyl chlorocarbonate	79-22-1	D	65000.0	680000.0
354	2-Methyl-4-chlorophenoxyacetic acid	94-74-6	D	33.0	340.0
355	4-(2-Methyl-4-chlorophenoxy) butyric acid (MCPB)	94-81-5	D	650.0	6800.0
356	2-(2-Methyl-4-chlorophenoxy) propionic acid	93-65-2	D	65.0	680.0
357	2-(2-Methyl-1,4-chlorophenoxy) propionic acid (MCPB)	16484-77-8	D	65.0	680.0
358	Methylcyclohexane	108-87-2	D	56000.0	590000.0
359	4,4'-Methylenbisbenzeneamine	101-77-9	D	18.0	76.0
360	4,4'-Methylene bis(2-chloroaniline)	101-14-4	B2	34.0	150.0
361	4,4'-Methylene bis(N,N'-dimethyl)aniline	101-61-1	B2	97.0	410.0
362	Methylene bromide	74-95-3	D	650.0	6800.0
363	Methylene chloride	75-09-2	B2	77.0	180.0
364	Methyl ethyl ketone	78-93-3	D	7100.0	27000.0
365	Methyl hydrazine	60-34-4	B, C	4.0	17.0
366	Methyl isobutyl ketone	108-10-1	D	770.0	2800.0

	Chemical Name	Cas-CAS Number	Cancer Group	Residential (mg/kg)	Non-residential (mg/kg)
367	* Methyl methacrylate	80-62-6	D	760.0	2800.0
368	2-Methyl-5-nitroaniline	99-55-8	C	130.0	580.0
369	Methyl parathion	298-00-0	D	16.0	170.0
370	2-Methylphenol	95-48-7	C	3300.0	34000.0
371	3-Methylphenol	108-39-4	C	3300.0	34000.0
372	4-Methylphenol	106-44-5	C	330.0	3400.0
373	Methyl styrene (mixture)	25013-15-4	D	120.0	520.0
374	* Methyl styrene (alpha)	98-83-9	D	890.0	3100.0
375	Methyl tertbutyl ether (MTBE)	1634-04-4	D	320.0	3300.0
376	Metolacolor (Dual)	51218-45-2	D	9800.0	100000.0
377	Metribuzin	21087-64-9	D	1600.0	17000.0
378	Mirex	2385-85-5	B2	2.5	11.0
379	Molinate	2212-67-1	D	130.0	1400.0
380	Molybdenum	7439-98-7	D	380.0	8500.0
381	Monochloramine	10599-90-3	D	6500.0	68000.0
	N				
382	Naled	300-76-5	D	130.0	1400.0
383	Naphthalene	91-20-3	D	2600.0	27000.0
384	Napropamide	15299-99-7	D	6500.0	68000.0
385	Nickel and compounds	7440-02-0	D	1500.0	34000.0
386	Nickel subsulfide	12035-72-2	A	5100.0	11000.0
387	Nitrapyrin	1929-82-4	D	98.0	1000.0
388	Nitrate	14797-55-8	D	100000.0	1000000.0
389	Nitrite	14797-65-0	D	6500.0	68000.0
390	2-Nitroaniline	88-74-4	D	3.9	41.0
391	Nitrobenzene	98-95-3	D	18.0	94.0
392	Nitrofurantoin	67-20-9	D	4600.0	48000.0
393	Nitrofurazone	59-87-0	B2	3.0	13.0
394	Nitroguanidine	556-88-7	D	6500.0	68000.0
395	N-Nitrosodi-n-butylamine	924-16-3	B2	0.22	0.55
396	N-Nitrosodiethanolamine	1116-54-7	B2	1.6	6.8
397	N-Nitrosodiethylamine	55-18-5	B2	0.03	0.13
398	N-Nitrosodimethylamine	62-75-9	B2	0.087	0.37
399	N-Nitrosodiphenylamine	86-30-6	B2	910.0	3900.0
400	N-Nitroso di-n-propylamine	621-64-7	B2	0.63	2.7
401	N-Nitroso-N-methylethylamine	10595-95-6	B2	0.20	0.87
402	N-Nitrosopyrrolidine	930-55-2	B2	2.1	9.1
403	m-Nitrotoluene	99-08-1	D	650.0	6800.0
404	p-Nitrotoluene	99-99-0	D	650.0	6800.0
405	Norflurazon	27314-13-2	D	2600.0	27000.0

	Chemical Name	Cas-CAS Number	Cancer Group	Residential (mg/kg)	Non-residential (mg/kg)
406	NuStar	85509-19-9	D	46.0	480.0
	O				
407	Octabromodiphenyl ether	32536-52-0	D	200.0	2000.0
408	Octahydro-1357-tetranitro-1357- tetrazocine (HMX)	2691-41-0	D	3300.0	34000.0
409	Octamethylpyrophosphoramide	152-16-9	D	130.0	1400.0
410	Oryzalin	19044-88-3	C	3300.0	34000.0
411	Oxadiazon	19666-30-9	D	330.0	3400.0
412	Oxamyl	23135-22-0	E	1600.0	17000.0
413	Oxyfluorfen	42874-03-3	D	200.0	2000.0
	P				
414	Paclobutrazol	76738-62-0	D	850.0	8900.0
415	Paraquat	4685-14-7	C	290.0	3100.0
416	Parathion	56-38-2	C	390.0	4100.0
417	Pebulate	1114-71-2	D	3300.0	34000.0
418	Pendimethalin	40487-42-1	D	2600.0	27000.0
419	Pentabromo-6-chloro cyclohexane	87-84-3	C	190.0	830.0
420	Pentabromodiphenyl ether	32534-81-9	D	130.0	1400.0
421	Pentachlorobenzene	608-93-5	D	52.0	550.0
422	Pentachloronitrobenzene	82-68-8	C	17.0	73.0
423	Pentachlorophenol	87-86-5	B2	25.0	79.0
424	Permethrin	52645-53-1	D	3300.0	34000.0
425	Phenmedipham	13684-63-4	D	16000.0	170000.0
426	Phenol	108-95-2	D	39000.0	410000.0
427	m-Phenylenediamine	108-45-2	D	390.0	4100.0
428	p-Phenylenediamine	106-50-3	D	12000.0	130000.0
429	Phenylmercuric acetate	62-38-4	D	5.2	55.0
430	2-Phenylphenol	90-43-7	C	2300.0	9800.0
431	Phorate	298-02-2	E	13.0	140.0
432	Phosmet	732-11-6	D	1300.0	14000.0
433	Phosphine	7803-51-2	D	20.0	200.0
434	Phosphorus, white	7723-14-0	D	1.5	34.0
435	Phthalic anhydride	85-44-9	D	130000.0	1000000.0
436	Picloram	1918-02-1	D	4600.0	48000.0
437	Pirimiphos-methyl	23505-41-1	D	650.0	6800.0
438	Polybrominated biphenyls (PBBs)	N/A	B2	0.46	2.1
439	Polychlorinated biphenyls (PCBs)	1336-36-3	B2	2.5	13.0
440	Potassium cyanide	151-50-8	D	3300.0	34000.0
441	Potassium silver cyanide	506-61-6	D	13000.0	140000.0
442	Prochloraz	67747-09-5	C	30.0	130.0

	Chemical Name	Cas-CAS Number	Cancer Group	Residential (mg/kg)	Non-residential (mg/kg)
443	Profluralin	26399-36-0	D	390.0	4100.0
444	Prometon	1610-18-0	D	980.0	10000.0
445	Prometryn	7287-19-6	D	260.0	2700.0
446	Pronamide	23950-58-5	C	4900.0	51000.0
447	Propachlor	1918-16-7	D	850.0	8900.0
448	Propanil	709-98-8	D	330.0	3400.0
449	Propargite	2312-35-8	D	1300.0	14000.0
450	Propargyl alcohol	107-19-7	D	130.0	1400.0
451	Propazine	139-40-2	C	1300.0	14000.0
452	Propham	122-42-9	D	1300.0	14000.0
453	Propiconazole	60207-90-1	D	850.0	8900.0
454	Propylene glycol	57-55-6	D	1000000.0	1000000.0
455	Propylene glycol, monoethyl ether	111-35-3	D	46000.0	480000.0
456	Propylene glycol, monomethyl ether	107-98-2	D	46000.0	480000.0
457	Propylene oxide	75-56-9	B2	19.0	79.0
458	Pursuit	81335-77-5	D	16000.0	170000.0
459	Pydrin	51630-58-1	D	1600.0	17000.0
460	Pyrene	129-00-0	D	2000.0	20000.0
461	Pyridine	110-86-1	D	65.0	680.0
Q					
462	Quinalphos	13593-03-8	D	33.0	340.0
463	Quinoline	91-22-5	C	0.37	1.6
R					
464	RDX (Cyclonite)	121-82-4	C	40.0	170.0
465	Resmethrin	10453-86-8	D	2000.0	20000.0
466	Ronnel	299-84-3	D	3300.0	34000.0
467	Rotenone	83-79-4	D	260.0	2700.0
S					
468	Savey	78578-05-0 <u>78587-05-0</u>	D	1600.0	17000.0
469	Selenious Acid	7783-00-8	D	330.0	3400.0
470	Selenium	7782-49-2	D	380.0	8500.0
471	Selenourea	630-10-4	D	330.0	3400.0
472	Sethoxydim	74051-80-2	D	5900.0	61000.0
473	Silver and compounds	7440-22-4	D	380.0	8500.0
474	Silver cyanide	506-64-9	D	6500.0	68000.0
475	Simazine	122-34-9	C	37.0	160.0
476	Sodium azide	26628-22-8	D	260.0	2700.0
477	Sodium cyanide	143-33-9	D	2600.0	27000.0
478	Sodium diethyldithiocarbamate	148-18-5	C	16.0	71.0

	Chemical Name	Cas-CAS Number	Cancer Group	Residential (mg/kg)	Non-residential (mg/kg)
479	Sodium fluoroacetate	62-74-8	D	1.3	14.0
480	Sodium metavanadate	13718-26-8	D	65.0	680.0
481	Strontium, stable	7440-24-6	D	46000.0	1000000.0
482	Strychnine	57-24-9	D	20.0	200.0
483	* Styrene	100-42-5	C	3300.0	3300.0
484	Systhane	88671-89-0	D	1600.0	17000.0
	T				
485	2,3,7,8-TCDD (dioxin)	1746-01-6	B2	0.000038	0.00024
486	Tebuthiuron	34014-18-1	D	4600.0	48000.0
487	Temephos	3383-96-8	D	1300.0	14000.0
488	Terbacil	5902-51-2	E	850.0	8900.0
489	Terbufos	13071-79-9	D	1.6	17.0
490	Terbutryn	886-50-0	D	65.0	680.0
491	1,2,4,5-Tetrachlorobenzene	95-94-3	D	20.0	200.0
492	1,1,1,2-Tetrachloroethane	630-20-6	C	23.0	54.0
493	1,1,2,2-Tetrachloroethane	79-34-5	C	4.4	11.0
494	Tetrachloroethylene (PCE)	127-18-4	B2	53.0	170.0
495	2,3,4,6-Tetrachlorophenol	58-90-2	D	2000.0	20000.0
496	p,a,a,a-Tetrachlorotoluene	5216-25-1	B2	0.22	0.95
497	Tetrachlorovinphos	961-11-5	C	190.0	790.0
498	Tetraethyldithiopyrophosphate	3689-24-5	D	33.0	340.0
499	Thallic oxide	1314-32-5	D	5.4	120.0
500	Thallium acetate	563-68-8	D	6.9	150.0
501	Thallium carbonate	6533-73-9	D	6.1	140.0
502	Thallium chloride	7791-12-0	D	6.1	140.0
503	Thallium nitrate	10102-45-1	D	6.9	150.0
504	Thallium selenite	12039-52-0	D	6.9	150.0
505	Thallium sulfate	7446-18-6	D	6.1	140.0
506	Thiobencarb	28249-77-6	D	650.0	6800.0
507	2-(Thiocyanomethylthio)- benzothiazole (TCMTB)	3689-24-5	D	2000.0	20000.0
508	Thiofanox	39196-18-4	D	20.0	200.0
509	Thiophanate-methyl	23564-05-8	D	5200.0	55000.0
510	Thiram	137-26-8	D	330.0	3400.0
511	Tin and compounds	7440-31-5	D	46000.0	1000000.0
512	* Toluene	108-88-3	D	790.0	2700.0
513	Toluene-2,4-diamine	95-80-7	B2	1.4	6.0
514	Toluene-2,5-diamine	95-70-5	D	39000.0	410000.0
515	Toluene-2,6-diamine	823-40-5	C	13000.0	140000.0
516	p-Toluidine	106-49-0	C	23.0	100.0

	Chemical Name	Cas-CAS Number	Cancer Group	Residential (mg/kg)	Non-residential (mg/kg)
517	Toxaphene	8001-35-2	B2	4.0	17.0
518	Tralomethrin	66841-25-6	D	490.0	5100.0
519	Triallate	2303-17-5	D	850.0	8900.0
520	Triasulfuron	82097-50-5	D	650.0	6800.0
521	1,2,4-Tribromobenzene	615-54-3	D	330.0	3400.0
522	Tributyltin oxide (TBTO)	56-35-9	D	2.0	20.0
523	2,4,6-Trichloroaniline	634-93-5	C	130.0	560.0
524	2,4,6-Trichloroaniline hydrochloride	33663-50-2	C	150.0	660.0
525	* 1,2,4-Trichlorobenzene	120-82-1	D	570.0	4700.0
526	* 1,1,1-Trichloroethane	71-55-6	D	1200.0	4800.0
527	1,1,2-Trichloroethane	79-00-5	C	6.5	15.0
528	Trichloroethylene (TCE)	79-01-6	B2	27.0	70.0
529	Trichlorofluoromethane	75-69-4	D	380.0	1300.0
530	2,4,5-Trichlorophenol	95-95-4	D	6500.0	68000.0
531	2,4,6-Trichlorophenol	88-06-2	B2	400.0	1700.0
532	2,4,5-Trichlorophenoxyacetic Acid acid	93-76-5	D	650.0	6800.0
533	2-(2,4,5-Trichlorophenoxy) propionic acid	93-72-1	D	520.0	5500.0
534	1,1,2-Trichloropropane	598-77-6	D	15.0	50.0
535	1,2,3-Trichloropropane	96-18-4	B2	0.014	0.03
536	1,2,3-Trichloropropene	96-19-5	D	11.0	38.0
537	* 1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	D	10000.0	10000.0
538	Tridiphan	58138-08-2	D	200.0	2000.0
539	Triethylamine	121-44-8	D	23.0	84.0
540	Trifluralin	1582-09-8	C	490.0	2500.0
541	Trimethyl phosphate	512-56-1	B2	120.0	520.0
542	1,3,5-Trinitrobenzene	99-35-4	D	3.3	34.0
543	Trinitrophenylmethylnitramine	479-45-8	D	650.0	6800.0
544	2,4,6-Trinitrotoluene	118-96-7	C	33.0	340.0
V					
545	Vanadium	7440-62-2	D	540.0	12000.0
546	Vanadium pentoxide	1314-62-1	D	690.0	15000.0
547	Vanadium sulfate	13701-70-7	D	1500.0	34000.0
548	Vernam	1929-77-7	D	65.0	680.0
549	Vinclozolin	50471-44-8	D	1600.0	17000.0
550	Vinyl acetate	108-05-4	D	780.0	2600.0
551	Vinyl bromide	593-60-2	B2	1.9	4.1
552	Vinyl chloride	75-01-4	A	0.016	0.035
W					
553	Warfarin	81-81-2	D	20.0	200.0
X					

	Chemical Name	Cas -CAS Number	Cancer Group	Residential (mg/kg)	Non-residential (mg/kg)
554	* Xylene (mixed)	1330-20-7	D	2800.0	2800.0
	Z				
555	Zinc	7440-66-6	D	23000.0	510000.0
556	Zinc phosphide	1314-84-7	D	23.0	510.0
557	Zinc cyanide	557-21-1	D	3300.0	34000.0
558	Zineb	12122-67-7	D	3300.0	34000.0

* = 1% free-phase analysis

= Based on IEUBK Model

~ = Based on natural background

N/A = Not Applicable

CARCINOGENICITY CLASSIFICATIONS:

A = Known human carcinogen

B1 = Probable human carcinogen, with limited data indicating human carcinogenicity.

B2 = Probable human carcinogen, with inadequate or no evidence of carcinogenicity in humans. Sufficient evidence for carcinogenicity in laboratory animals.

C = Possible human carcinogen.

D = Not classifiable as to human carcinogenicity.

E = Evidence of noncarcinogenicity in humans.

~~Appendix B. Notice of Voluntary Environmental Mitigation Use Restriction By Owner or Owners~~

~~When recorded, mail to:~~

~~NOTICE OF VOLUNTARY ENVIRONMENTAL MITIGATION USE RESTRICTION BY OWNER OR OWNERS~~

~~Pursuant to A.R.S. § 49-152(B), the owner or owners _____ of the
following described property:~~

~~(Please Print)~~

~~(insert legal description of entire parcel)~~

~~has (have) remediated a portion of the above described property, which remediated portion is described as follows:~~

~~(insert legal description of remediated portion, the source of the release, and the remaining contaminants)~~

~~The date when the remediation was completed is: _____~~

~~The undersigned owner voluntarily agrees to limit and restrict the use of the remediated portion of the property to
nonresidential uses, as defined in A.R.S. § 49-151(A).~~

~~Signature of owner~~

County of _____

On this _____ day of _____, 19____, before me personally appeared _____ (name of signer), whose identity was proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to this document, and who acknowledged that he/she signed the above document.

Notary Public

(Notary Seal) _____ My commission expires: _____

Signature of owner

(if 2nd owner's signature is required)

County of _____

On this _____ day of _____, 19____, before me personally appeared _____ (name of signer), whose identity was proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to this document, and who acknowledged that he/she signed the above document.

Notary Public

(Notary Seal) _____ My commission expires: _____

~~(ADEO official)~~

County of _____

On this _____ day of _____, 19____, before me personally appeared _____ (name of signer), whose identity was proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to this document, and who acknowledged that he/she signed the above document.

Notary Public

(Notary Seal) My commission expires: _____

Please make no marks below this line

Appendix C. Cancellation of Voluntary Environmental Mitigation Use Restriction By Owner or Owners Repealed

When recorded, mail to:

**CANCELLATION OF VOLUNTARY ENVIRONMENTAL MITIGATION
USE RESTRICTION BY OWNER OR OWNERS**

Pursuant to A.R.S. § 49-152(B), the owner or owners _____
of the following described property:

(Please Print)

(insert legal description of entire parcel)

recorded a Notice of Voluntary Mitigation Use Restriction By Owner or Owners in the Office of the County Recorder of
_____ County, Arizona on the _____ day of _____, _____ in Document/Docket _____ at Page _____,
affecting the following portion of the above described property:

(insert legal description of remediated portion)

Pursuant to A.R.S. § 49-152(C), the undersigned hereby cancel or cancels the above described notice and declare or declares said
notice to be of no further force and effect as of this _____ day of _____, _____.

Signature of owner

STATE OF ARIZONA

County of _____

On this _____ day of _____, 19____, before me personally appeared _____ (name of
signer), whose identity was proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to
this document, and who acknowledged that he/she signed the above document.

Notary Public

(Notary Seal)

My commission expires: _____

(ADEQ official)

STATE OF ARIZONA

County of _____

On this ____ day of _____, 19____, before me personally appeared _____ (name of
signer), whose identity was proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to
this document, and who acknowledged that he/she signed the above document.

Notary Public

(Notary Seal)

My commission expires: _____

Please make no marks below this line _____
